INSTALLATION MANUAL

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NOTES, CAUTIONS AND WARNINGS

The installer should pay particular attention to the words: *NOTE*, *CAUTION*, and *WARNING*. Notes are intended to clarify or make the installation easier. Cautions are given to prevent equipment damage. Warnings are given to alert installer that personal injury and/or equipment damage may result if installation procedure is not handled properly.

CAUTION: READ ALL SAFETY GUIDES BEFORE YOU BEGIN TO INSTALL YOUR UNIT.

SAVE THIS MANUAL

PREDATOR®

MagnaDRY™

SINGLE PACKAGE AIR CONDITIONERS AND SINGLE PACKAGE GAS/ELECTRIC UNITS

DR090, 120 and 150

DR090 and 120

DR150

Tested in accordance with:

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GENERAL

YORK® Predator MagnaDRY™ units are single package air conditioners with optional gas heating designed for outdoor installation on a rooftop or slab and for non-residential use. These units can be equipped with factory or field installed electric heaters for heating applications.

These units are completely assembled on rigid, permanently attached base rails. All piping, refrigerant charge, and electrical wiring is factory installed and tested. The units require electric power, gas supply (where applicable), and duct connections. The electric heaters have nickel-chrome elements and utilize single-point power connection.

SAFETY CONSIDERATIONS

⚠WARNING

Should overheating occur, or the gas supply fail to shut off, shut off the manual gas valve to the furnace before shutting off the electrical supply.

Do not use this furnace if any part has been under water. Immediately call a qualified service technician to inspect the furnace and to replace any part of the control system and any gas control which has been under water.

Due to system pressure, moving parts, and electrical components, installation and servicing of air conditioning equipment can be hazardous. Only qualified, trained service personnel should install, repair, or service this equipment. Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters.

Observe all precautions in the literature, labels, and tags accompanying the equipment whenever working on air conditioning equipment. Be sure to follow all other applicable safety precautions and codes including ANSI Z223.1 or CSA-B149.1- latest edition.

Wear safety glasses and work gloves. Use quenching cloth and have a fire extinguisher available during brazing operations.

⚠WARNING

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WHAT TO DO IF YOU SMELL GAS:

a. Do not try to light any appliance.

b. Do not touch any electrical switch; do not use any phone in your building.

c. Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.

d. If you cannot reach your gas supplier, call the fire department.

Installation and service must be performed by a qualified installer, service agency or the gas supplier.

INSPECTION

As soon as a unit is received, it should be inspected for possible damage during transit. If damage is evident, the extent of the damage should be noted on the carrier's freight bill. A separate request for inspection by the carrier's agent should be made in writing.

⚠WARNING

This furnace is not to be used for temporary heating of buildings or structures under construction.

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury. Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual. For assistance or additional information consult a qualified installer, service agency or the gas supplier.

REFERENCE

Additional information is available in the following reference forms:

- Technical Guide - DR090-150, 036-21551-001
- General Installation - DR090 - 150, 035-19763-000
- Pre-start & Post-start Check List - 035-18466-000
- Economizer Accessory -
  Downflow Factory Installed, 035-18286-000
  Downflow Field Installed, 035-18285-000
  Horizontal Field Installed, 035-18287-000
- Motorized Outdoor Air Damper 035-18283-000
- Manual Outdoor Air Damper (0-100%) 035-18282-000
- Manual Outdoor Air Damper (0-35%) 035-18281-000
- Gas Heat Propane Conversion Kit 035-17374-000
- Gas Heat High Altitude Kit (Natural Gas) 035-17282-000
- Gas Heat High Altitude Kit (Propane) 035-17281-000
- –60°F Gas Heat Kit 035-18216-000
- Electric Heater Accessory 035-17291-001
- Unit Renewal Parts List -
  DR090, 035-19794-000
  DR120, 035-19795-000
  DR150, 035-19796-000

RENEWAL PARTS

Refer to York's USER'S MAINTENANCE and SERVICE INFORMATION MANUAL Part Number 035-19047-002.

APPROVALS

Design certified by CSA as follows:

1. For use as a cooling only unit, cooling unit with supplemental electric heat or a forced air furnace.
2. *For outdoor installation only.*
3. For installation on combustible material and may be installed directly on combustible flooring or, in the U.S., on wood flooring or Class A, Class B or Class C roof covering materials.
4. For use with natural gas (convertible to LP with kit).

⚠ CAUTION

This product must be installed in strict compliance with the enclosed installation instructions and any applicable local, state, and national codes including, but not limited to, building, electrical, and mechanical codes.

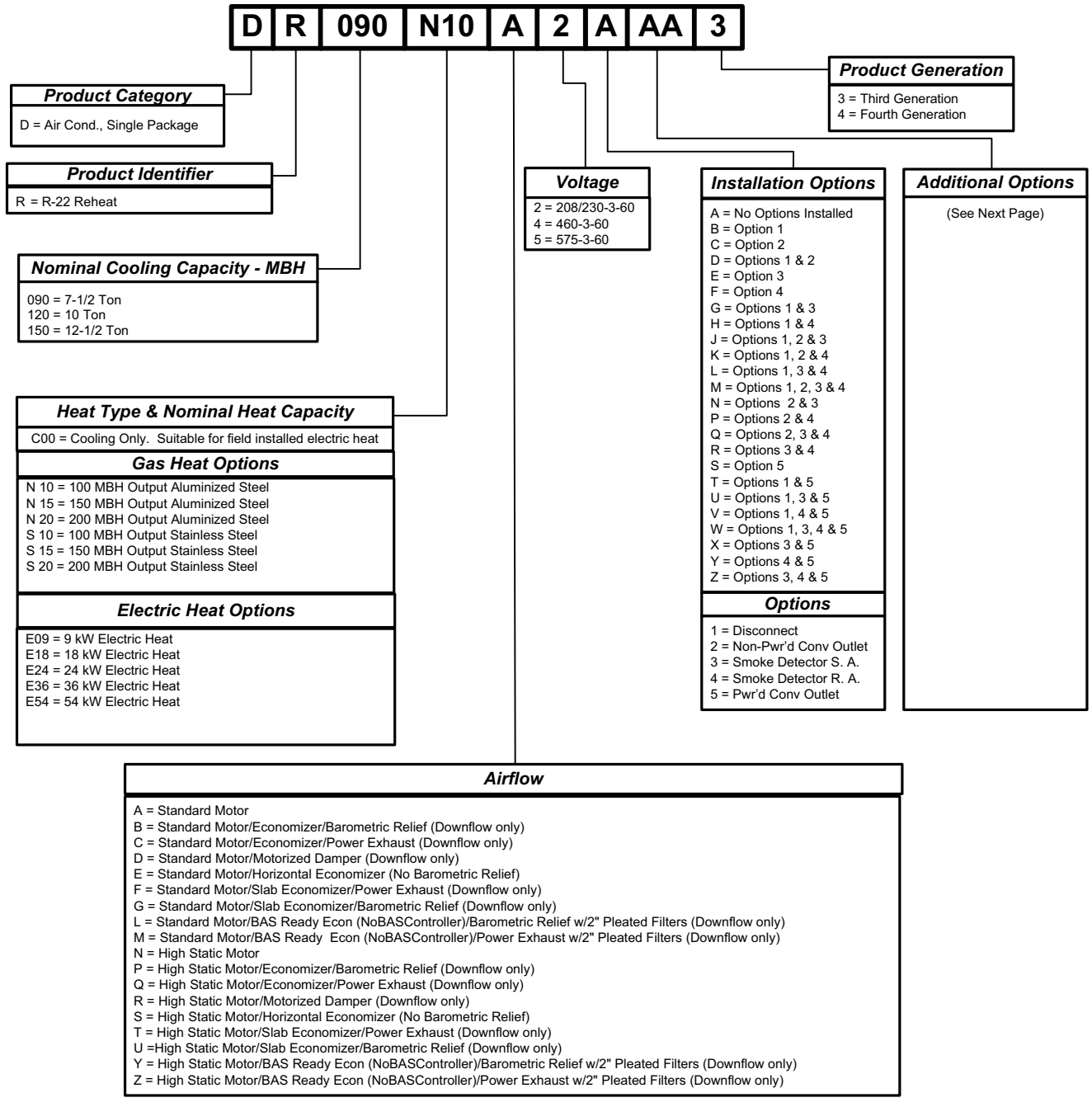
⚠ WARNING

Incorrect installation may create a condition where the operation of the product could cause personal injury or property damage.

The installer should pay particular attention to the words: NOTE, CAUTION, and WARNING. NOTES are intended to clarify or make the installation easier. CAUTIONS are given to prevent equipment damage. WARNINGS are given to alert installer that personal injury and/or equipment damage may result if installation procedure is not handled properly.

NOMENCLATURE

Predator MagnaDRY™ Model Number Nomenclature


D R 090 N10 A 2 A AA 3
Product Category
D = Air Cond., Single Package
Product Identifier
R = R-22 Reheat
Nominal Cooling Capacity - MBH
090 = 7-1/2 Ton
120 = 10 Ton
150 = 12-1/2 Ton
Heat Type & Nominal Heat Capacity
C00 = Cooling Only. Suitable for field installed electric heat
Gas Heat Options
N 10 = 100 MBH Output Aluminized Steel
N 15 = 150 MBH Output Aluminized Steel
N 20 = 200 MBH Output Aluminized Steel
S 10 = 100 MBH Output Stainless Steel
S 15 = 150 MBH Output Stainless Steel
S 20 = 200 MBH Output Stainless Steel
Electric Heat Options
E09 = 9 kW Electric Heat
E18 = 18 kW Electric Heat
E24 = 24 kW Electric Heat
E36 = 36 kW Electric Heat
E54 = 54 kW Electric Heat
Airflow
A = Standard Motor
B = Standard Motor/Economizer/Barometric Relief (Downflow only)
C = Standard Motor/Economizer/Power Exhaust (Downflow only)
D = Standard Motor/Motorized Damper (Downflow only)
E = Standard Motor/Horizontal Economizer (No Barometric Relief)
F = Standard Motor/Slab Economizer/Power Exhaust (Downflow only)
G = Standard Motor/Slab Economizer/Barometric Relief (Downflow only)
L = Standard Motor/BAS Ready Econ (NoBASController)/Barometric Relief w/2" Pleated Filters (Downflow only)
M = Standard Motor/BAS Ready Econ (NoBASController)/Power Exhaust w/2" Pleated Filters (Downflow only)
N = High Static Motor
P = High Static Motor/Economizer/Barometric Relief (Downflow only)
Q = High Static Motor/Economizer/Power Exhaust (Downflow only)
R = High Static Motor/Motorized Damper (Downflow only)
S = High Static Motor/Horizontal Economizer (No Barometric Relief)
T = High Static Motor/Slab Economizer/Power Exhaust (Downflow only)
U =High Static Motor/Slab Economizer/Barometric Relief (Downflow only)
Y = High Static Motor/BAS Ready Econ (NoBASController)/Barometric Relief w/2" Pleated Filters (Downflow only)
Z = High Static Motor/BAS Ready Econ (NoBASController)/Power Exhaust w/2" Pleated Filters (Downflow only)
Voltage
2 = 208/230-3-60
4 = 460-3-60
5 = 575-3-60
Installation Options
A = No Options Installed
B = Option 1
C = Option 2
D = Options 1 & 2
E = Option 3
F = Option 4
G = Options 1 & 3
H = Options 1 & 4
J = Options 1, 2 & 3
K = Options 1, 2 & 4
L = Options 1, 3 & 4
M = Options 1, 2, 3 & 4
N = Options 2 & 3
P = Options 2 & 4
Q = Options 2, 3 & 4
R = Options 3 & 4
S = Option 5
T = Options 1 & 5
U = Options 1, 3 & 5
V = Options 1, 4 & 5
W = Options 1, 3, 4 & 5
X = Options 3 & 5
Y = Options 4 & 5
Z = Options 3, 4 & 5
Options
1 = Disconnect
2 = Non-Pwr'd Conv Outlet
3 = Smoke Detector S. A.
4 = Smoke Detector R. A.
5 = Pwr'd Conv Outlet
Additional Options
(See Next Page)
Product Generation
3 = Third Generation
4 = Fourth Generation

NOMENCLATURE, ADDITIONAL OPTIONS:

AA	None
AB	Phase Monitor
AC	Coil Guard
AD	Dirty Filter Switch
AE	Phase Monitor & Coil Guard
AF	Phase Monitor & Dirty Filter Switch
AG	Coil Guard & Dirty Filter Switch
AH	Phase Monitor, Coil Guard, & Dirty Filter Switch
AJ	SS Drain Pan
AK	SS Drain Pan & Phase Monitor
AL	SS Drain Pan & Coil Guard
AM	SS Drain Pan & Dirty Filter Switch
AN	SS Drain Pan, Phase Monitor, Coil Guard & Dirty Filter Switch
CA	CPC Controller with Dirty Filter Switch & Air Proving Switch
CB	CPC Controller, DFS, APS & Phase Monitor
CC	CPC Controller, DFS, APS & Coil Guard
CD	CPC Controller, DFS, APS, Phase Monitor, & Coil Guard
CE	CPC Controller, DFS, APS & Technicoat Cond. Coil
CF	CPC Controller, DFS, APS, Technicoat Cond. Coil, & Phase Monitor
CG	CPC Controller, DFS, APS, Technicoat Cond. Coil, & Coil Guard
CH	CPC Controller, DFS, APS, Technicoat Cond. Coil, Phase Monitor, & Coil Guard
CJ	CPC Controller, DFS, APS & Technicoat Evap. Coil
CK	CPC Controller, DFS, APS, Technicoat Evap. Coil, & Phase Monitor
CL	CPC Controller, DFS, APS, Technicoat Evap. Coil, & Coil Guard
CM	CPC Controller, DFS, APS, Technicoat Evap. Coil, Phase Monitor, & Coil Guard
CN	CPC Controller, DFS, APS & Technicoat Evap. & Cond Coils
CP	CPC Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Phase Monitor
CQ	CPC Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Coil Guard
CR	CPC Controller, DFS, APS, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard
CS	CPC Controller, DFS, APS, SS Drain Pan
CT	CPC Controller, DFS, APS, SS Drain Pan, Phase Monitor, & Coil Guard
CU	CPC Controller, DFS, APS, SS Drain Pan, & Technicoat Cond Coils
CV	CPC Controller, DFS, APS, SS Drain Pan, & Technicoat Evap Coil
CW	CPC Controller, DFS, APS, SS Drain Pan, & Technicoat Evap and Cond Coils
CX	CPC Controller, DFS, APS, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
JA	Johnson UNT Controller with Dirty Filter Switch & Air Proving Switch
JB	Johnson UNT Controller, DFS, APS & Phase Monitor
JC	Johnson UNT Controller, DFS, APS & Coil Guard
JD	Johnson UNT Controller, DFS, APS, Phase Monitor, & Coil Guard
JE	Johnson UNT Controller, DFS, APS & Technicoat Cond. Coil
JF	Johnson UNT Controller, DFS, APS, Technicoat Cond. Coil, & Phase Monitor
JG	Johnson UNT Controller, DFS, APS, Technicoat Cond. Coil, & Coil Guard
JH	Johnson UNT Controller, DFS, APS, Technicoat Cond. Coil, Phase Monitor, & Coil Guard
JJ	Johnson UNT Controller, DFS, APS & Technicoat Evap. Coil
JK	Johnson UNT Controller, DFS, APS, Technicoat Evap. Coil, & Phase Monitor
JL	Johnson UNT Controller, DFS, APS, Technicoat Evap. Coil, & Coil Guard
JM	Johnson UNT Controller, DFS, APS, Technicoat Evap. Coil, Phase Monitor, & Coil Guard
JN	Johnson UNT Controller, DFS, APS & Technicoat Evap. & Cond Coils
JP	Johnson UNT Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Phase Monitor
JQ	Johnson UNT Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Coil Guard
JR	Johnson UNT Controller, DFS, APS, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard
JS	Johnson UNT Controller, DFS, APS, SS Drain Pan
JT	Johnson UNT Controller, DFS, APS, SS Drain Pan, Phase Monitor, & Coil Guard
JU	Johnson UNT Controller, DFS, APS, SS Drain Pan, & Technicoat Cond Coils
JV	Johnson UNT Controller, DFS, APS, SS Drain Pan, & Technicoat Evap Coil
JW	Johnson UNT Controller, DFS, APS, SS Drain Pan, & Technicoat Evap and Cond Coils
JX	Johnson UNT Controller, DFS, APS, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
HA	Honeywell Excel 10 Controller with Dirty Filter Switch & Air Proving Switch

HB	Honeywell Excel 10 Controller, DFS, APS & Phase Monitor
HC	Honeywell Excel 10 Controller, DFS, APS & Coil Guard
HD	Honeywell Excel 10 Controller, DFS, APS, Phase Monitor, & Coil Guard
HE	Honeywell Excel 10 Controller, DFS, APS & Technicoat Cond. Coil
HF	Honeywell Excel 10 Controller, DFS, APS, Technicoat Cond. Coil, & Phase Monitor
HG	Honeywell Excel 10 Controller, DFS, APS, Technicoat Cond. Coil, & Coil Guard
HH	Honeywell Excel 10 Controller, DFS, APS, Technicoat Cond. Coil, Phase Monitor, & Coil Guard
HJ	Honeywell Excel 10 Controller, DFS, APS & Technicoat Evap. Coil
HK	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. Coil, & Phase Monitor
HL	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. Coil, & Coil Guard
HM	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. Coil, Phase Monitor, & Coil Guard
HN	Honeywell Excel 10 Controller, DFS, APS & Technicoat Evap. & Cond Coils
HP	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Phase Monitor
HQ	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Coil Guard
HR	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard
HS	Honeywell Excel 10 Controller, DFS, APS, SS Drain Pan
HT	Honeywell Excel 10 Controller, DFS, APS, SS Drain Pan, Phase Monitor, & Coil Guard
HU	Honeywell Excel 10 Controller, DFS, APS, SS Drain Pan, & Technicoat Cond Coils
HV	Honeywell Excel 10 Controller,DFS, APS, SS Drain Pan, & Technicoat Evap Coil
HW	Honeywell Excel 10 Controller,DFS, APS, SS Drain Pan, & Technicoat Evap and Cond Coils
HX	Honeywell Excel 10 Controller,DFS, APS, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
WA	Intelli-Comfort w/ModLINC Controller with Dirty Filter Switch & Air Proving Switch
WB	Intelli-Comfort w/ModLINC Controller, & Phase Monitor
WC	Intelli-Comfort w/ModLINC Controller, & Coil Guard
WD	Intelli-Comfort w/ModLINC Controller, Phase Monitor, & Coil Guard
WE	Intelli-Comfort w/ModLINC Controller, & Technicoat Cond. Coil
WF	Intelli-Comfort w/ModLINC Controller, Technicoat Cond. Coil, & Phase Monitor
WG	Intelli-Comfort w/ModLINC Controller, Technicoat Cond. Coil, & Coil Guard
WH	Intelli-Comfort w/ModLINC Controller, Technicoat Cond. Coil, Phase Monitor, & Coil Guard
WJ	Intelli-Comfort w/ModLINC Controller, & Technicoat Evap. Coil
WK	Intelli-Comfort w/ModLINC Controller, Technicoat Evap. Coil, & Phase Monitor
WL	Intelli-Comfort w/ModLINC Controller, Technicoat Evap. Coil, & Coil Guard
WM	Intelli-Comfort w/ModLINC Controller, Technicoat Evap. Coil, Phase Monitor, & Coil Guard
WN	Intelli-Comfort w/ModLINC Controller, & Technicoat Evap. & Cond Coils
WP	Intelli-Comfort w/ModLINC Controller, Technicoat Evap. & Cond Coils, & Phase Monitor
WQ	Intelli-Comfort w/ModLINC Controller, Technicoat Evap. & Cond Coils, & Coil Guard
WR	Intelli-Comfort w/ModLINC Controller, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard
WS	Intelli-Comfort w/ModLINC Controller, SS Drain Pan
WT	Intelli-Comfort w/ModLINC Controller, SS Drain Pan, Phase Monitor, & Coil Guard
WU	Intelli-Comfort w/ModLINC Controller, SS Drain Pan, & Technicoat Cond Coils
WV	Intelli-Comfort w/ModLINC Controller, SS Drain Pan, & Technicoat Evap Coil
WW	Intelli-Comfort w/ModLINC Controller, SS Drain Pan, & Technicoat Evap and Cond Coils
WX	Intelli-Comfort w/ModLINC Controller, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
NA	Novar ETC-3 Controller with Dirty Filter Switch & Air Proving Switch
NB	Novar ETC-3 Controller, DFS, APS & Phase Monitor
NC	Novar ETC-3 Controller, DFS, APS & Coil Guard
ND	Novar ETC-3 Controller, DFS, APS, Phase Monitor, & Coil Guard
NE	Novar ETC-3 Controller, DFS, APS & Technicoat Cond. Coil
NF	Novar ETC-3 Controller, DFS, APS, Technicoat Cond. Coil, & Phase Monitor
NG	Novar ETC-3 Controller, DFS, APS, Technicoat Cond. Coil, & Coil Guard
NH	Novar ETC-3 Controller, DFS, APS, Technicoat Cond. Coil, Phase Monitor, & Coil Guard
NJ	Novar ETC-3 Controller, DFS, APS & Technicoat Evap. Coil
NK	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. Coil, & Phase Monitor
NL	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. Coil, & Coil Guard
NM	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. Coil, Phase Monitor, & Coil Guard
NN	Novar ETC-3 Controller, DFS, APS & Technicoat Evap. & Cond Coils
NP	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Phase Monitor
NQ	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Coil Guard
NR	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard

NS	Novar ETC-3 Controller, DFS, APS, SS Drain Pan
NT	Novar ETC-3 Controller, DFS, APS, SS Drain Pan, Phase Monitor, & Coil Guard
NU	Novar ETC-3 Controller, DFS, APS, SS Drain Pan, & Technicoat Cond Coils
NV	Novar ETC-3 Controller, DFS, APS, SS Drain Pan, & Technicoat Evap Coil
NW	Novar ETC-3, DFS, APS, SS Drain Pan, & Technicoat Evap and Cond Coils
NX	Novar ETC-3 Controller, DFS, APS, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
LA	Simplicity Intelli-Comfort Controller
LB	Simplicity Intelli-Comfort Controller, & Phase Monitor
LC	Simplicity Intelli-Comfort Controller, & Coil Guard
LD	Simplicity Intelli-Comfort Controller, Phase Monitor, & Coil Guard
LE	Simplicity Intelli-Comfort Controller, & Technicoat Cond. Coil
LF	Simplicity Intelli-Comfort Controller, Technicoat Cond. Coil, & Phase Monitor
LG	Simplicity Intelli-Comfort Controller, Technicoat Cond. Coil, & Coil Guard
LH	Simplicity Intelli-Comfort Controller, Technicoat Cond. Coil, Phase Monitor, & Coil Guard
LJ	Simplicity Intelli-Comfort Controller, & Technicoat Evap. Coil
LK	Simplicity Intelli-Comfort Controller, Technicoat Evap. Coil, & Phase Monitor
LL	Simplicity Intelli-Comfort Controller, Technicoat Evap. Coil, & Coil Guard
LM	Simplicity Intelli-Comfort Controller, Technicoat Evap. Coil, Phase Monitor, & Coil Guard
LN	Simplicity Intelli-Comfort Controller, & Technicoat Evap. & Cond Coils
LP	Simplicity Intelli-Comfort Controller, Technicoat Evap. & Cond Coils, & Phase Monitor
LQ	Simplicity Intelli-Comfort Controller, Technicoat Evap. & Cond Coils, & Coil Guard
LR	Simplicity Intelli-Comfort Controller, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard
LS	Simplicity Intelli-Comfort Controller, SS Drain Pan
LT	Simplicity Intelli-Comfort Controller, SS Drain Pan, Phase Monitor, & Coil Guard
LU	Simplicity Intelli-Comfort Controller, SS Drain Pan, & Technicoat Cond Coils
LV	Simplicity Intelli-Comfort Controller, SS Drain Pan, & Technicoat Evap Coil
LW	Simplicity Intelli-Comfort Controller, SS Drain Pan, & Technicoat Evap and Cond Coils
LX	Simplicity Intelli-Comfort Controller, SS Drain Pan, Phase Monitor, Coil Guard, & Technicoat Evap and Cond Coils
TA	Technicoat Condenser Coil
TB	Technicoat Condenser Coil & Phase Monitor
TC	Technicoat Condenser Coil & Coil Guard
TD	Technicoat Condenser Coil & Dirty Filter Switch
TE	Technicoat Condenser Coil, Phase Monitor, & Coil Guard
TF	Technicoat Condenser Coil, Phase Monitor, & Dirty Filter Switch
TG	Technicoat Condenser Coil, Coil Guard, & Dirty Filter Switch
TH	Technicoat Condenser Coil, Phase Monitor, Coil Guard, & Dirty Filter Switch
TJ	Technicoat Evaporator Coil
TK	Technicoat Evaporator Coil & Phase Monitor
TL	Technicoat Evaporator Coil & Coil Guard
TM	Technicoat Evaporator Coil & Dirty Filter Switch
TN	Technicoat Evaporator Coil, Phase Monitor, & Coil Guard
TP	Technicoat Evaporator Coil, Phase Monitor, & Dirty Filter Switch
TQ	Technicoat Evaporator Coil, Coil Guard, & Dirty Filter Switch
TR	Technicoat Evaporator Coil, Phase Monitor, Coil Guard, & Dirty Filter Switch
TS	Technicoat Evaporator & Condenser Coils
TT	Technicoat Evaporator & Condenser Coils & Phase Monitor
TU	Technicoat Evaporator & Condenser Coils & Coil Guard
TV	Technicoat Evaporator & Condenser Coils & Dirty Filter Switch
TW	Technicoat Evaporator & Condenser Coils, Phase Monitor, & Coil Guard
TX	Technicoat Evaporator & Condenser Coils, Phase Monitor, & Dirty Filter Switch
TY	Technicoat Evaporator & Condenser Coils, Coil Guard, & Dirty Filter Switch
TZ	Technicoat Evaporator & Condenser Coils, Phase Monitor, Coil Guard, & Dirty Filter Switch
T1	Technicoat Condenser & SS Drain Pan
T3	Technicoat Condenser Coil, SS Drain Pan, Phase Monitor, Coil Guard, & Dirty Filter Switch
T4	Technicoat Evaporator & SS Drain Pan
T6	Technicoat Evaporator Coil, SS Drain Pan, Phase Monitor, Coil Guard, & Dirty Filter Switch
T7	Technicoat Evaporator & Condenser Coils & SS Drain Pan
T9	Technicoat Evaporator & Condenser Coils, SS Drain Pan, Phase Monitor, Coil Guard, & Dirty Filter Switch

INSTALLATION

INSTALLATION SAFETY INFORMATION

Read these instructions before continuing this appliance installation. This is an outdoor combination heating and cooling unit. The installer must assure that these instructions are made available to the consumer and with instructions to retain them for future reference.

1. Refer to the furnace rating plate for the approved type of gas for this furnace.
2. Install this furnace only in a location and position as specified on Page 14 of these instructions.
3. Never test for gas leaks with an open flame. Use commercially available soap solution made specifically for the detection of leaks when checking all connections, as specified on Pages 11, 30, 31 and 60 of these instructions.
4. Always install furnace to operate within the furnace's intended temperature-rise range with the duct system and within the allowable external static pressure range, as specified on the unit name/rating plate, specified on Page 62 of these instructions.
5. This equipment is not to be used for temporary heating of buildings or structures under construction.

⚠WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warning exactly could result in serious injury, death or property damage.

Never test for gas leaks with an open flame. use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.

PRECEDING INSTALLATION

1. Remove the two screws holding the brackets in the front, rear and compressor side fork-lift slots.

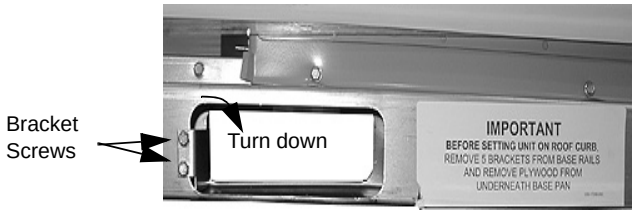


FIGURE 1 - UNIT SHIPPING BRACKET

2. Turn each bracket toward the ground and the protective plywood covering will drop to the ground.
3. Remove the condenser coil external protective covering prior to operation.
4. Remove the toolless doorknobs and instruction packet prior to installation.

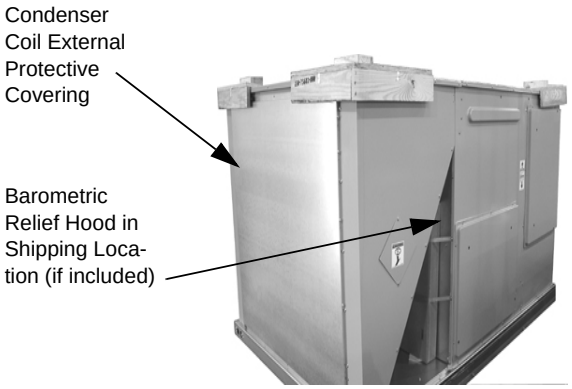


FIGURE 2 - CONDENSER COVERING

FIGURE 3 - COMPRESSOR SECTION

⚠ CAUTION

This product must be installed in strict compliance with the enclosed installation instructions and any applicable local, state and national codes including, but not limited to, building, electrical, and mechanical codes.

The furnace and its individual shut-off valve must be disconnected from the gas supply piping system during any pressure testing at pressures in excess of 1/2 PSIG.

Pressures greater than 1/2 PSIG will cause gas valve damage resulting in a hazardous condition. If it is subjected to a pressure greater than 1/2 PSIG, the gas valve must be replaced.

The furnace must be isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 PSIG.

LIMITATIONS

These units must be installed in accordance with the following:

In U.S.A.:

1. National Electrical Code, ANSI/NFPA No. 70 - Latest Edition
2. National Fuel Gas Code, ANSI Z223.1 - Latest Edition
3. Gas-Fired Central Furnace Standard, ANSI Z21.47a. - Latest Edition
4. Local building codes, and
5. Local gas utility requirements

In Canada:

1. Canadian Electrical Code, CSA C22.1
2. Installation Codes, CSA - B149.1.
3. Local plumbing and waste water codes, and
4. Other applicable local codes.

Refer to Tables 1 & 2 for unit application data.

After installation, gas fired units must be adjusted to obtain a temperature rise within the range specified on the unit rating plate.

If components are to be added to a unit to meet local codes, they are to be installed at the dealer's and/or customer's expense.

Size of unit for proposed installation should be based on heat loss/heat gain calculation made according to the methods of Air Conditioning Contractors of America (ACCA).

This furnace is not to be used for temporary heating of buildings or structures under construction.

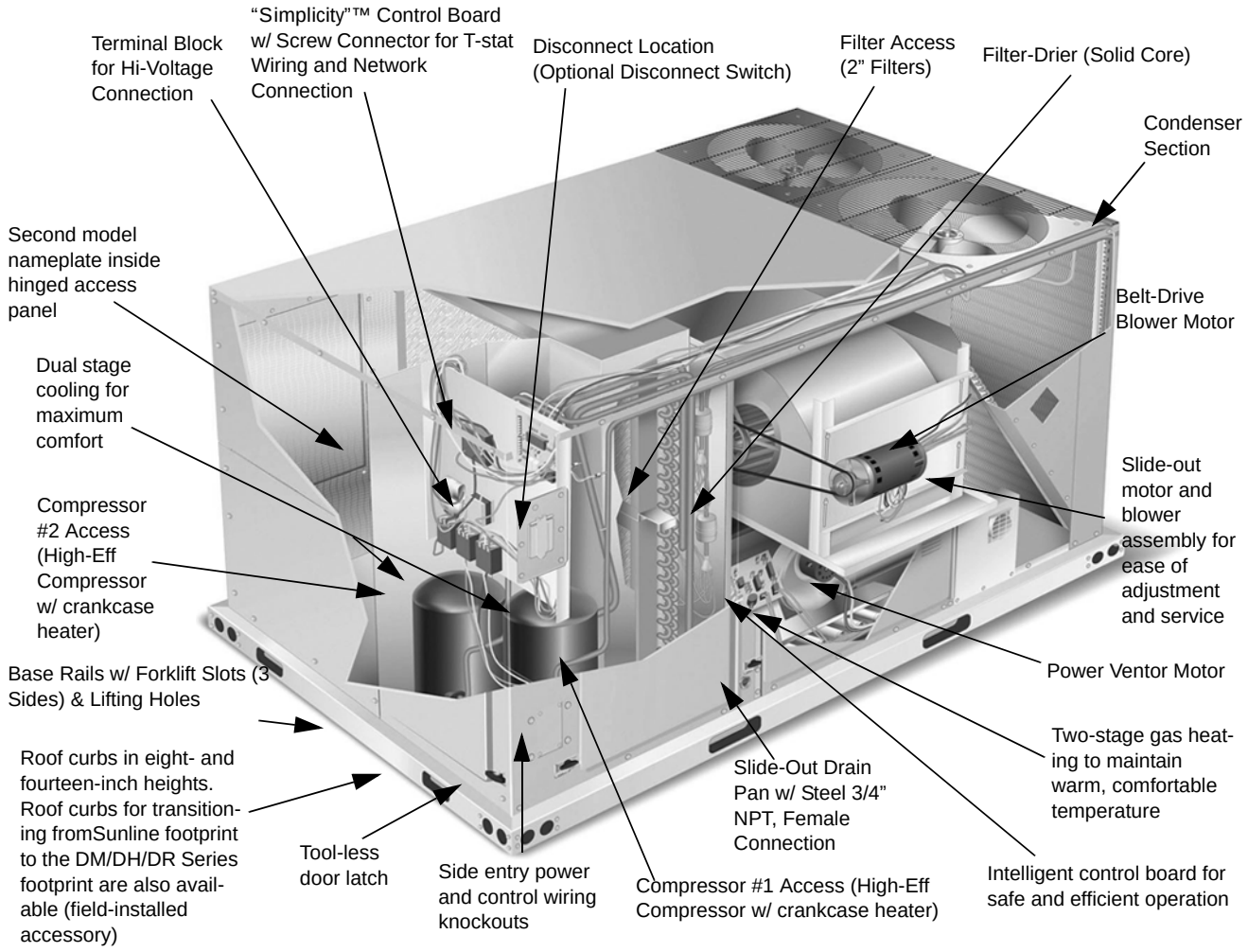

Terminal Block for Hi-Voltage Connection
"Simplicity"™ Control Board w/ Screw Connector for T-stat Wiring and Network Connection
Disconnect Location (Optional Disconnect Switch)
Filter Access (2" Filters)
Filter-Drier (Solid Core)
Condenser Section
Second model nameplate inside hinged access panel
Belt-Drive Blower Motor
Dual stage cooling for maximum comfort
Slide-out motor and blower assembly for ease of adjustment and service
Compressor #2 Access (High-Eff Compressor w/ crankcase heater)
Power Ventor Motor
Base Rails w/ Forklift Slots (3 Sides) & Lifting Holes
Two-stage gas heating to maintain warm, comfortable temperature
Roof curbs in eight- and fourteen-inch heights. Roof curbs for transitioning fromSunline footprint to the DM/DH/DR Series footprint are also available (field-installed accessory)
Slide-Out Drain Pan w/ Steel 3/4" NPT, Female Connection
Tool-less door latch
Side entry power and control wiring knockouts
Compressor #1 Access (High-Eff Compressor w/ crankcase heater)
Intelligent control board for safe and efficient operation

FIGURE 4 - PREDATOR MagnaDRY™ DR090 & 120 COMPONENT LOCATION

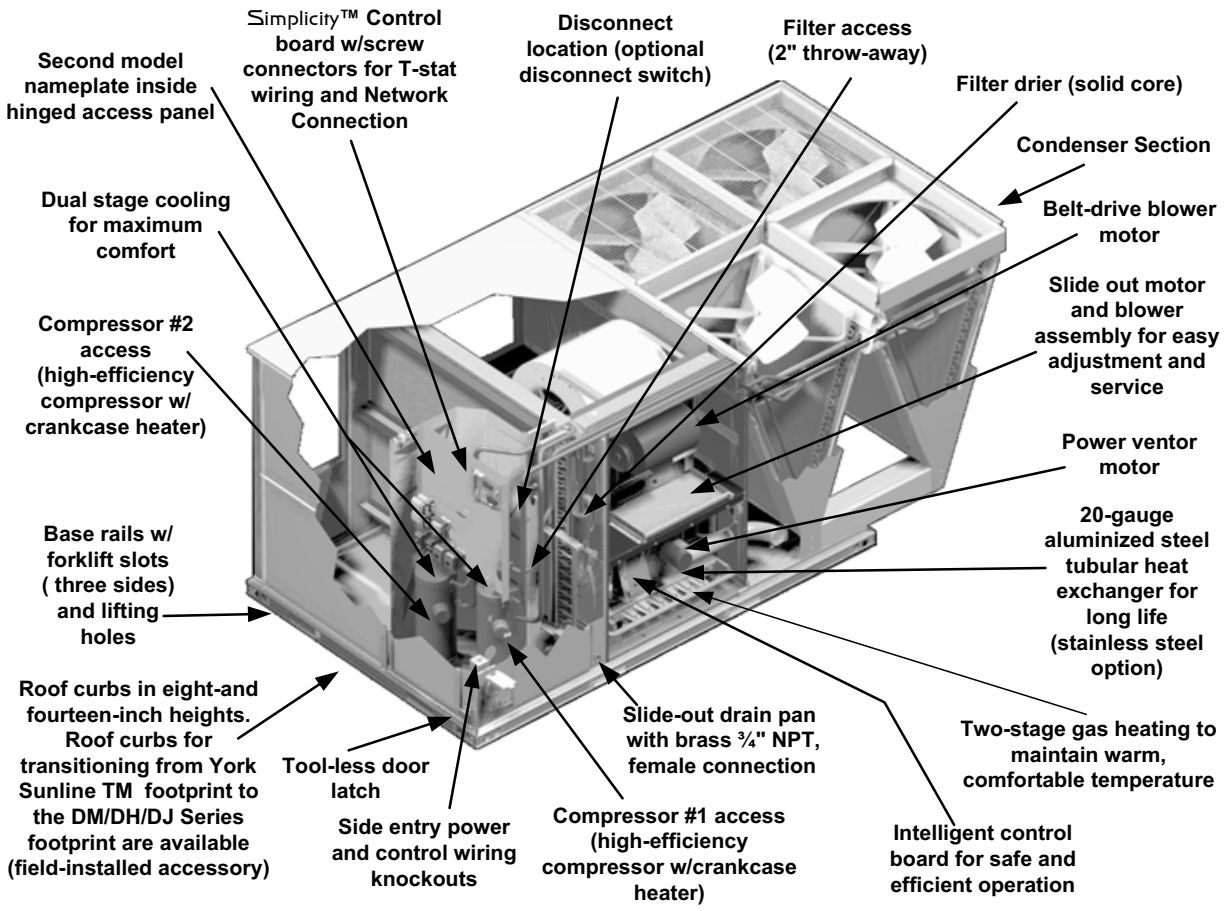

Second model nameplate inside hinged access panel
Simplicity™ Control board w/screw connectors for T-stat wiring and Network Connection
Disconnect location (optional disconnect switch)
Filter access (2" throw-away)
Filter drier (solid core)
Condenser Section
Belt-drive blower motor
Dual stage cooling for maximum comfort
Slide out motor and blower assembly for easy adjustment and service
Compressor #2 access (high-efficiency compressor w/ crankcase heater)
Power ventor motor
20-gauge aluminized steel tubular heat exchanger for long life (stainless steel option)
Base rails w/ forklift slots (three sides) and lifting holes
Roof curbs in eight-and fourteen-inch heights. Roof curbs for transitioning from York Sunline TM footprint to the DM/DH/DJ Series footprint are available (field-installed accessory)
Tool-less door latch
Side entry power and control wiring knockouts
Slide-out drain pan with brass ¾" NPT, female connection
Compressor #1 access (high-efficiency compressor w/crankcase heater)
Two-stage gas heating to maintain warm, comfortable temperature
Intelligent control board for safe and efficient operation

FIGURE 5 - PREDATOR MagnaDRY™ DR150 COMPONENT LOCATION

TABLE 1: UNIT VOLTAGE LIMITATIONS

Power Rating*	Minimum	Maximum
208/230-3-60	187	252
460-3-60	432	504
575-3-60	540	630

*. Utilization range “A” in accordance with ARI Standard 110.

TABLE 2: UNIT TEMPERATURE LIMITATIONS

Temperature	Min.	Max.
Wet Bulb Temperature (°F) of Air on Evaporator Coil	57	72
Dry Bulb Temperature (°F) of Air on Condenser Coil	0*	125

*. A low ambient accessory is available for operation down to -20°F.

LOCATION

Use the following guidelines to select a suitable location for these units:

1. Unit is designed for *outdoor installation only.*
2. Condenser coils must have an unlimited supply of air. Where a choice of location is possible, position the unit on either north or east side of building.
3. Suitable for mounting on roof curb.
4. For ground level installation, use a level concrete slab with a minimum thickness of 4 inches. The length and width should be at least 6 inches greater than the unit base rails. Do not tie slab to the building foundation.
5. Roof structures must be able to support the weight of the unit and its options/accessories. Unit must be installed on a solid, level roof curb or appropriate angle iron frame.
6. Maintain level tolerance to 1/2” across the entire width and length of unit.

⚠WARNING

Excessive exposure of this furnace to contaminated combustion air may result in equipment damage or personal injury. Typical contaminates include: permanent wave solution, chlorinated waxes and cleaners, chlorine based swimming pool chemicals, water softening chemicals, carbon tetrachloride, Halogen type refrigerants, cleaning solvents (e.g. perchloroethylene), printing inks, paint removers, varnishes, hydrochloric acid, cements and glues, antistatic fabric softeners for clothes dryers, masonry acid washing materials.

RIGGING AND HANDLING

Exercise care when moving the unit. Do not remove any packaging until the unit is near the place of installation. Rig the unit by attaching chain or cable slings to the lifting holes provided in the base rails. Spreader bars, whose length exceeds the largest dimension across the unit, **MUST** be used across the top of the unit.

⚠ CAUTION

If a unit is to be installed on a roof curb other than a YORK roof curb, gasketing must be applied to all surfaces that come in contact with the unit underside.

⚠ CAUTION

Before lifting, make sure the unit weight is distributed equally on the rigging cables so it will lift evenly.

Units may be moved or lifted with a forklift. Slotted openings in the base rails are provided for this purpose.

LENGTH OF FORKS MUST BE A MINIMUM OF 60 INCHES.

⚠ CAUTION

All panels must be secured in place when the unit is lifted.

The condenser coils should be protected from rigging cable damage with plywood or other suitable material.

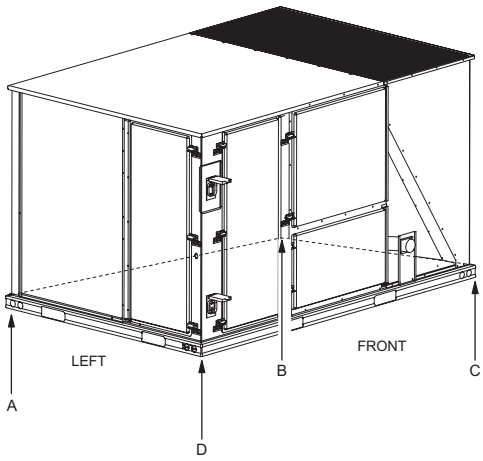


FIGURE 6 - DR090 & 120 UNITS 4 POINT LOAD

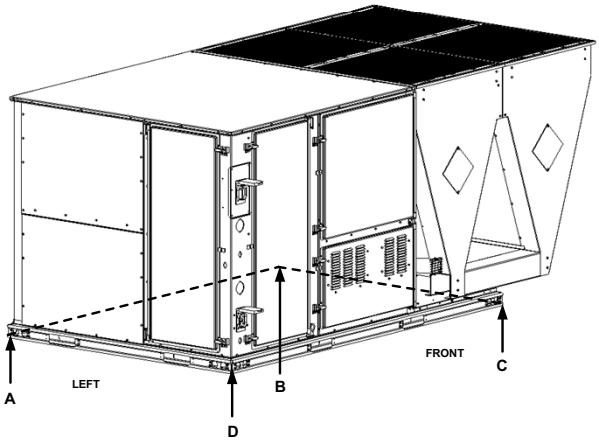


FIGURE 7 - DR150 UNIT 4 POINT LOAD

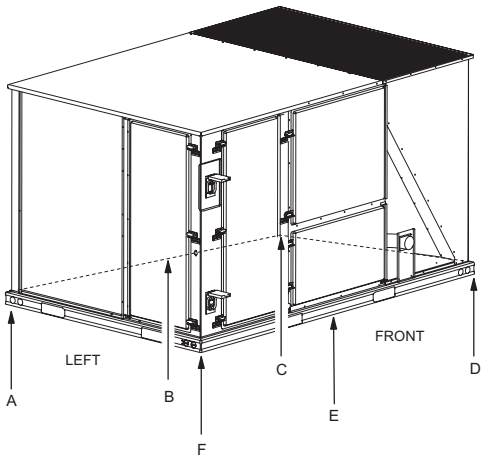


FIGURE 8 - DR090 & 120 UNITS 6 POINT LOAD

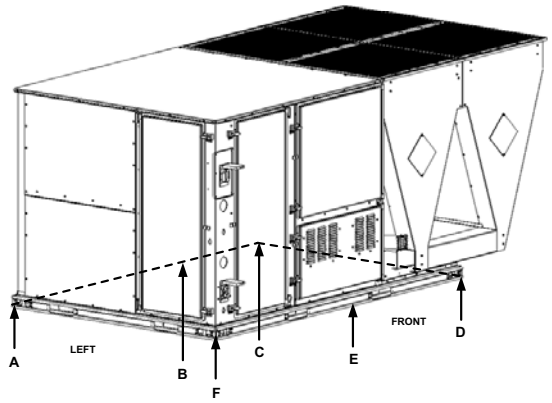


FIGURE 9 - DR150 UNIT 6 POINT LOAD

TABLE 3: UNIT WEIGHTS

Model	Shipping Weight* (lb.)	Operating Weight* (lb.)
DR090	1163	1148
DR120	1277	1262
DR150	1560	1545
w/Econ.	85	84
w/ PE	150	148
w/Elec. Heat	49	49
w/Gas Heat†	110	110

*. 54 kW heater.

†. 8 Tube Heat Exchanger.

TABLE 4: 4 POINT LOAD WEIGHT

Model	Location (lbs.)*			
	A	B	C	D
DR090	250	215	309	374
DR120	276	237	341	408
DR150	293	370	479	393

*. Weights include largest gas heat option.

TABLE 5: 6 POINT LOAD WEIGHT

Model	Location (lbs.)*					
	A	B	C	D	E	F
DR090	171	154	139	201	225	258
DR120	188	170	154	220	248	282
DR150	191	217	253	329	286	260

*. Weights include largest gas heat option.

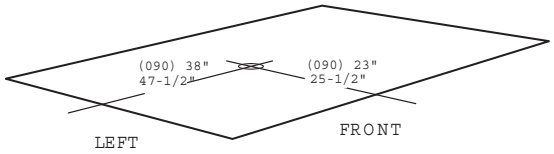


FIGURE 10 - UNIT CENTER OF GRAVITY (DR090, 120)

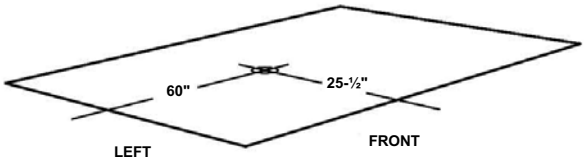


FIGURE 11 - UNIT CENTER OF GRAVITY - DR150

CLEARANCES

All units require particular clearances for proper operation and service. Installer must make provisions for adequate combustion and ventilation air in accordance with section 5.3 of Air for Combustion and Ventilation of the National Fuel Gas Code, ANSI Z223.1 – Latest Edition (in U.S.A.), or Sections 7.2, 7.3, or 7.4 of Gas Installation Codes, CSA-B149.1 (in Canada) - Latest Edition, and/or applicable provisions of the local building codes. Refer to Table 6 for clearances required for combustible construction, servicing, and proper unit operation.

⚠WARNING

Do not permit overhanging structures or shrubs to obstruct condenser air discharge outlet, combustion air inlet or vent outlets.

⚠WARNING

Excessive exposure to contaminated combustion air will result in safety and performance related problems. To maintain combustion air quality, the recommended source of combustion air is the outdoor air supply. The outdoor air supplied for combustion should be free from contaminants due to chemical exposure that may be present from the following sources.

- Commercial buildings
- Indoor pools
- Laundry rooms
- Hobby or craft rooms
- Chemical storage areas

The following substances should be avoided to maintain outdoor combustion air quality.

- Permanent wave solutions
- Chlorinated waxes and cleaners
- Chlorine based swimming pool cleaners
- Water softening chemicals
- De-icing salts or chemicals
- Carbon tetrachloride
- Halogen type refrigerants
- Cleaning solvents (such as perchloroethylene)
- Printing inks, paint removers, varnishes, etc.
- Hydrochloric acid
- Cements and glues
- Anti-static fabric softeners for clothes dryers
- Masonry acid washing materials

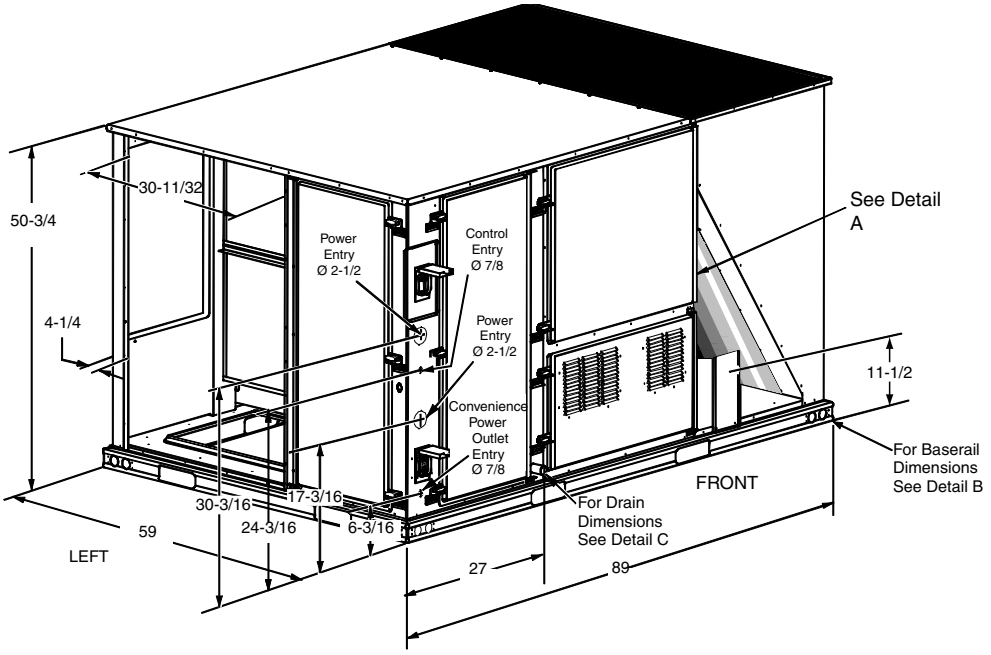


FIGURE 12 - DR090 & 120 UNIT DIMENSIONS

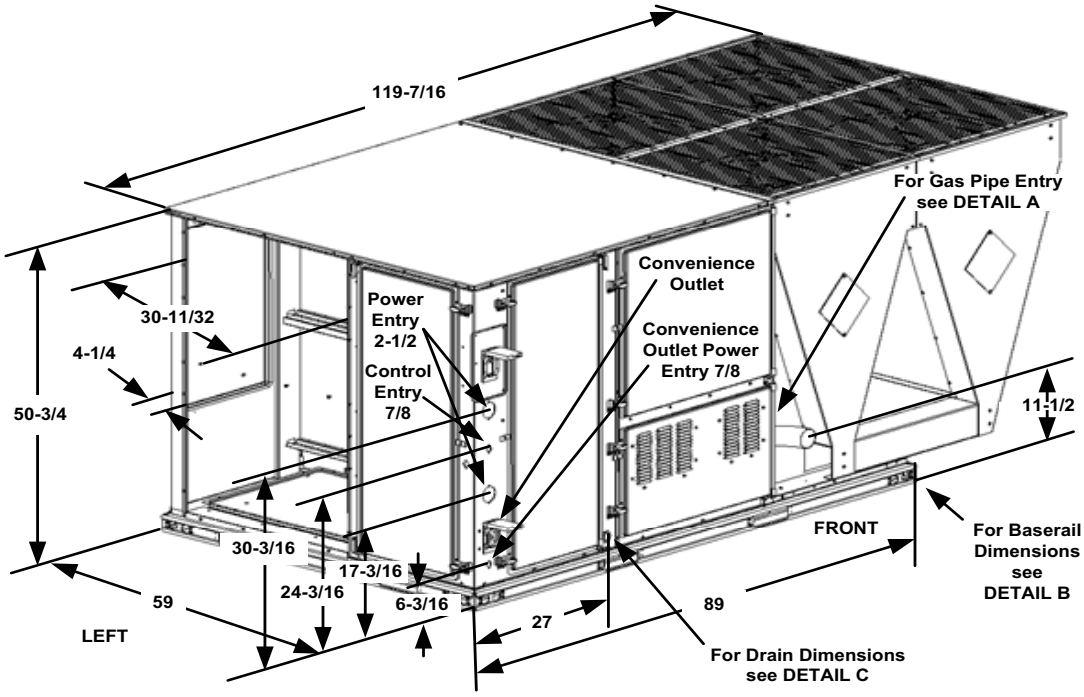


FIGURE 13 - DR150 UNIT DIMENSIONS

TABLE 6: UNIT CLEARANCES

Top*	72”	**Right**	12”
Front†	36”	**Left**	36”
Rear‡	36”	**Bottom****	0”

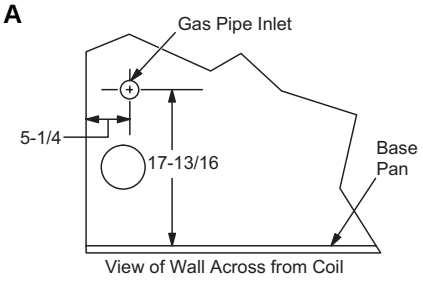
*. Units must be installed outdoors. Overhanging structure or shrubs should not obstruct condenser air discharge outlet.

†. The products of combustion must not be allowed to accumulate within a confined space and re-circulate.

‡. To remove the slide-out drain pan, a rear clearance of sixty inches is required. If space is unavailable, the drain pan can be removed through the front by separating the corner wall.

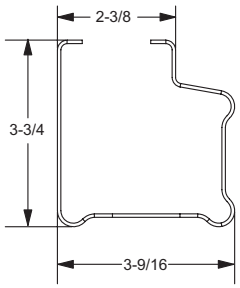
**. Units may be installed on combustible floors made from wood or class A, B or C roof covering materials.

DETAIL A

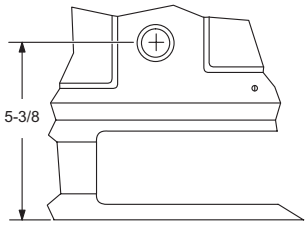


NOTE: A one-inch clearance must be provided between any combustible material and the supply ductwork for a distance of 3 feet from the unit.

DETAIL B



DETAIL C



NOTE: If the unit includes gas heating, locate the unit so the flue exhaust is at least:

- Three (3) feet above any forced air inlet located within 10 horizontal feet (excluding those integral to the unit).
- Four (4) feet below, four (4) horizontal feet from, or one (1) foot above any door or gravity air inlet into the building.
- Four (4) feet from electric meters, gas meters, regulators, and relief equipment.

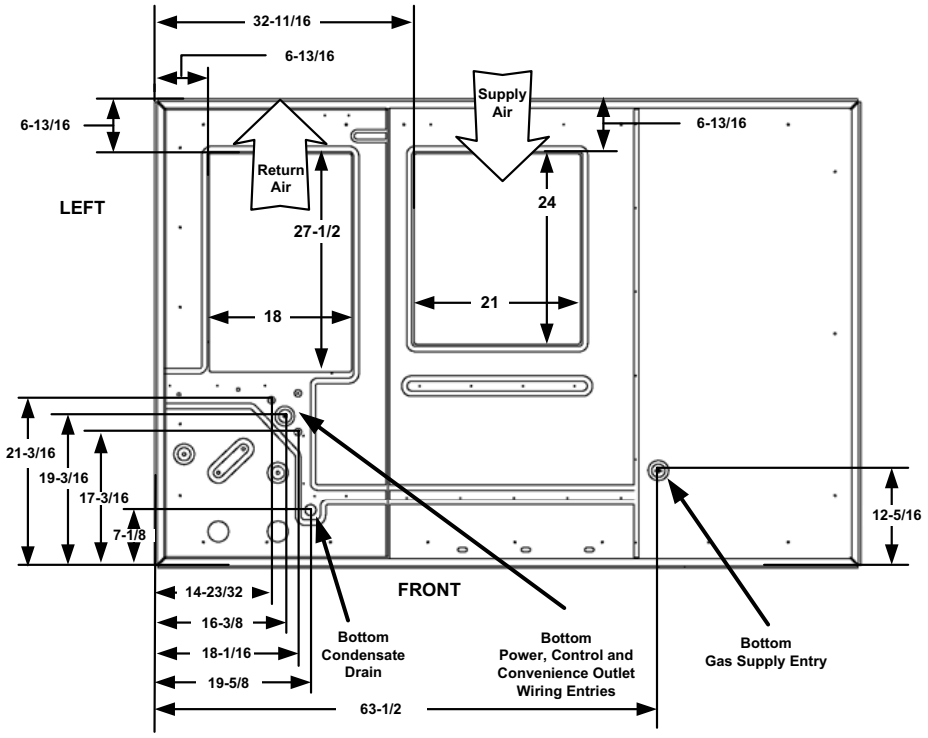


FIGURE 14 - BOTTOM DUCT OPENINGS (FROM ABOVE)

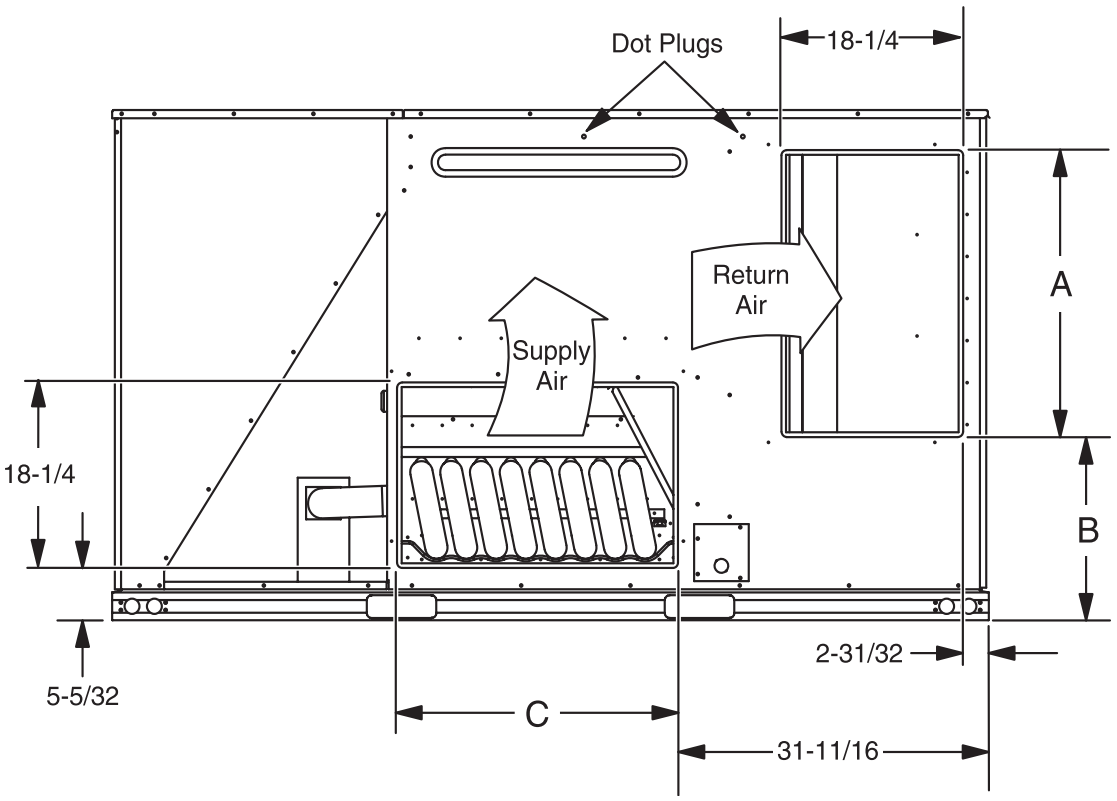


FIGURE 15 - DR090 & 120 REAR DUCT DIMENSIONS

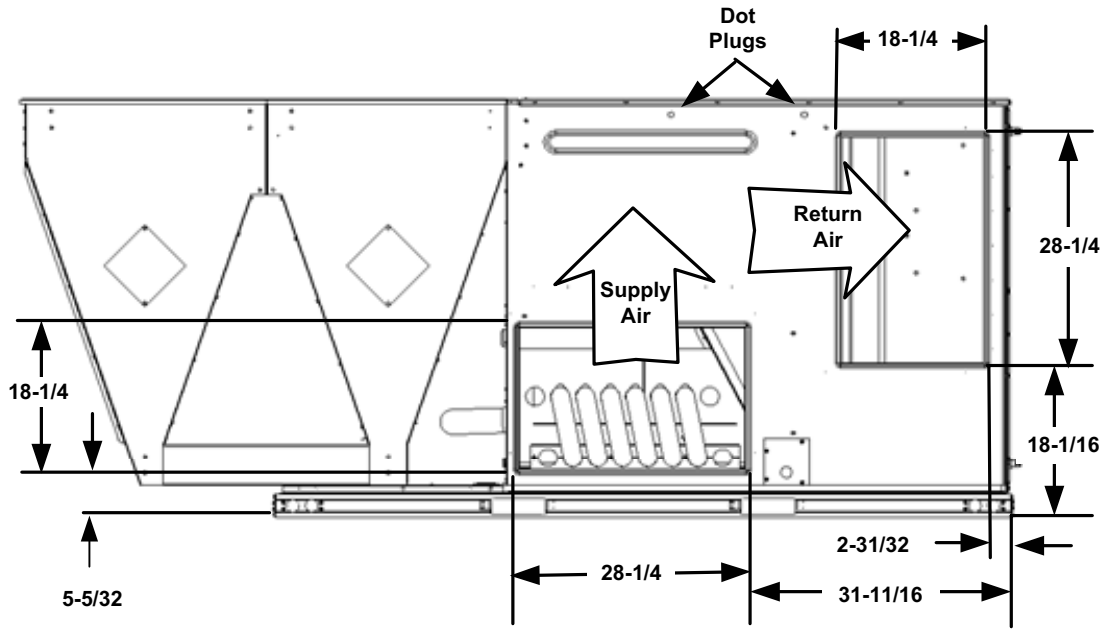


FIGURE 16 - DR150 REAR DUCT DIMENSIONS

DUCTWORK

Ductwork should be designed and sized according to the methods in Manual D of the Air Conditioning Contractors of America (ACCA) or as recommended by any other recognized authority such as ASHRAE or SMACNA.

A closed return duct system should be used. This will not preclude use of economizers or outdoor fresh air intake. The supply and return air duct connections at the unit should be made with flexible joints to minimize noise.

The supply and return air duct systems should be designed for the CFM and static pressure requirements of the job. They should NOT be sized to match the dimensions of the duct connections on the unit.

Refer to Figure 14 for bottom air duct openings. Refer to Figure 15 and 16 for rear air duct openings.

DUCT COVERS

Units are shipped with the side duct openings covered and a covering over the bottom of the unit. For bottom duct application, no duct cover changes are necessary. For side duct application, remove the side duct covers and install over the bottom duct openings. The panels removed from the side duct connections are designed to be reused by securing each panel to its respective downflow opening. But keep in mind that the supply panel is installed with the painted surface UP, facing the heat exchanger, while the return panel is installed with the painted surface DOWN, facing the downflow duct opening. The supply panel is secured with the bracket (already in place from the factory) and two screws. It's a snug fit for the panel when sliding it between the heat exchanger and unit bottom, but there is room. The return panel is secured with four screws.

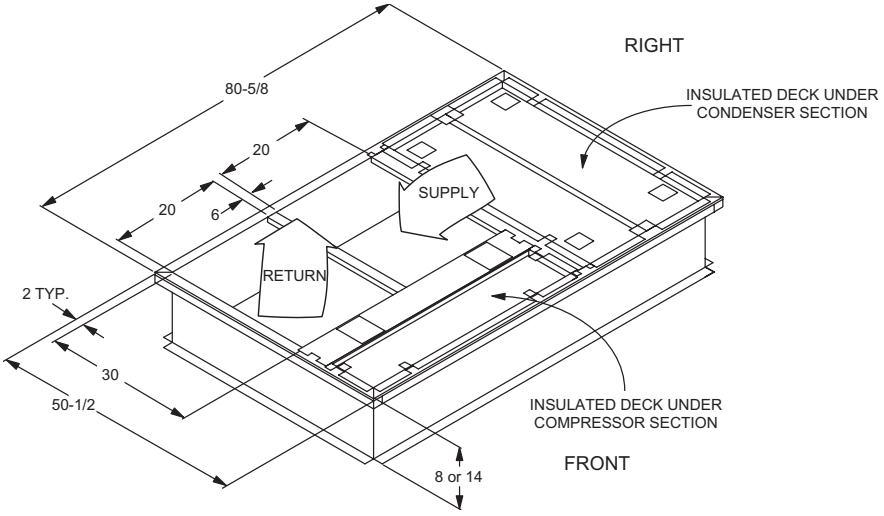


FIGURE 17 - PREDATOR® ROOF CURB DIMENSIONS

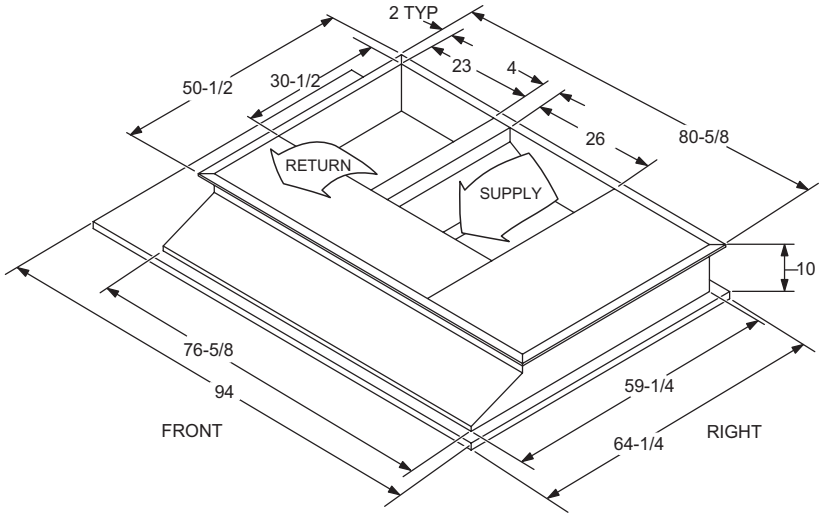


FIGURE 18 - SUNLINE™ TO PREDATOR® TRANSITION ROOF CURBS

⚠ CAUTION

When fastening ductwork to side duct flanges on unit, insert screws through duct flanges only. DO NOT insert screws through casing. Outdoor ductwork must be insulated and water-proofed.

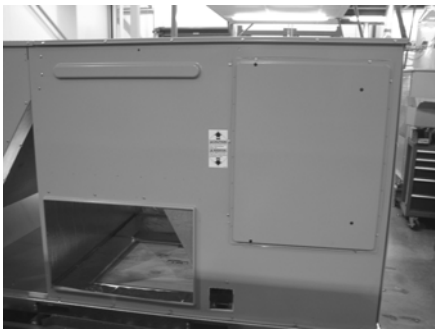


FIGURE 19 - SIDE PANELS WITH HOLE PLUGS

Note orientation. Panel is “insulation” side up.

FIGURE 20 - RETURN DOWNFLOW PLENUM WITH PANEL

FIGURE 21 - DISCHARGE PANEL IN PLACE

CONDENSATE DRAIN

The side condensate drain is reversible and maybe re-oriented to the rear of the cabinet to facilitate condensate piping. A condensate drain connection is available through the base pan for piping inside the roof curb. Trap the connection per Figure 22. The trap and drain lines should be protected from freezing.

Plumbing must conform to local codes. Use a sealing compound on male pipe threads. Install condensate drain line from the 3/4 inch NPT female connection on the unit to an open drain.

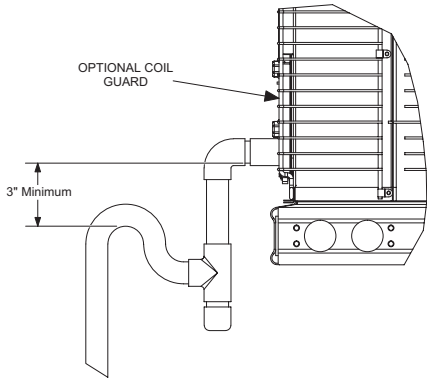


FIGURE 22 - CONDENSATE DRAIN

COMPRESSORS

The compressors are mounted on elastomer insulators. The mounting bolts have been fully tightened for shipping.

⚠ CAUTION

Do not loosen the compressor mounting bolts.

FILTERS

Two-inch filters are supplied with each unit. One-inch filters may be used with no modification to the filter racks. Filters must always be installed ahead of evaporator coil and must be kept clean or replaced with same size and type. Dirty filters reduce the capacity of the unit and result in frosted coils or safety shutdown. All units use four (4) 20”x25”x2” filters. The unit should not be operated without filters properly installed.

⚠ CAUTION

Make sure that panel latches are properly positioned on the unit to maintain an airtight seal.

THERMOSTAT WIRING

The thermostat should be located on an inside wall approximately 56 inch above the floor where it will not be subject to drafts, sun exposure or heat from electrical fixtures or appliances. Follow the manufacturer's instructions enclosed with thermostat for general installation procedure. Seven (7) color-coded, insulated wires should be used to connect the thermostat to the unit. Refer to Table 7 for control wire sizing and maximum length.

TABLE 7: CONTROL WIRE SIZES

Wire Size	Maximum Length*
18 AWG	150 Feet

*. From the unit to the thermostat and back to the unit.

POWER AND CONTROL WIRING

Field wiring to the unit, fuses, and disconnects must conform to provisions of National Electrical Code (NEC), ANSI/NFPA No. 70 – Latest Edition (in U.S.A.), current Canadian Electrical Code C221, and/or local ordinances. The unit must be electrically grounded in accordance with NEC and CEC as specified above and/or local codes.

Voltage tolerances which must be maintained at the compressor terminals during starting and running conditions are indicated on the unit Rating Plate and Table 1.

The internal wiring harnesses furnished with this unit are an integral part of the design certified unit. Field alteration to comply with electrical codes should not be required. If any of the wire supplied with the unit must be replaced, replacement wire must be of the type shown on the wiring diagram and the same minimum gauge as the replaced wire.

A disconnect must be utilized for these units. Factory installed disconnects are available. If installing a disconnect (field supplied or York International® supplied accessory), refer to Figures 4 and 5 for the recommended mounting location.

⚠ CAUTION

Avoid damage to internal components if drilling holes for disconnect mounting.

NOTE: Since not all local codes allow the mounting of a disconnect on the unit, please confirm compliance with local code before mounting a disconnect on the unit.

Electrical line must be sized properly to carry the load. USE COPPER CONDUCTORS ONLY. Each unit must be wired with a separate branch circuit fed directly from the meter panel and properly fused.

Refer to Figure 23 for typical field wiring and to the appropriate unit wiring diagram mounted inside control doors for control circuit and power wiring information.

⚠ CAUTION

When connecting electrical power and control wiring to the unit, water-proof connectors must be used so that water or moisture cannot be drawn into the unit during normal operation. The above water-proofing conditions will also apply when installing a field supplied disconnect switch.

POWER WIRING DETAIL

Units are factory wired for the voltage shown on the unit nameplate. Refer to Electrical Data Tables 8 to 13 to size power wiring, fuses, and disconnect switch.

Power wiring is brought into the unit through the side of the unit or the basepan inside the curb.

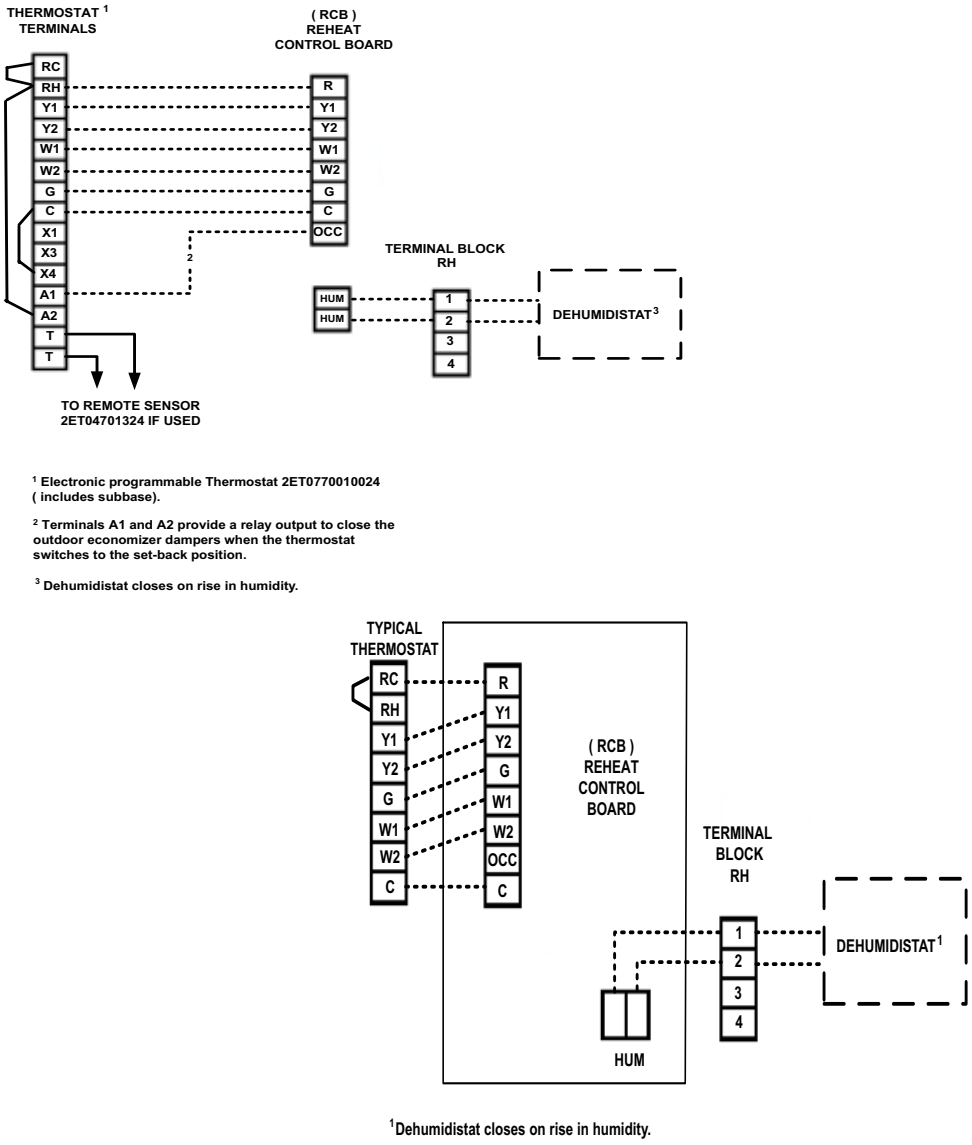


FIGURE 23 -TYPICAL LOW VOLTAGE FIELD WIRING

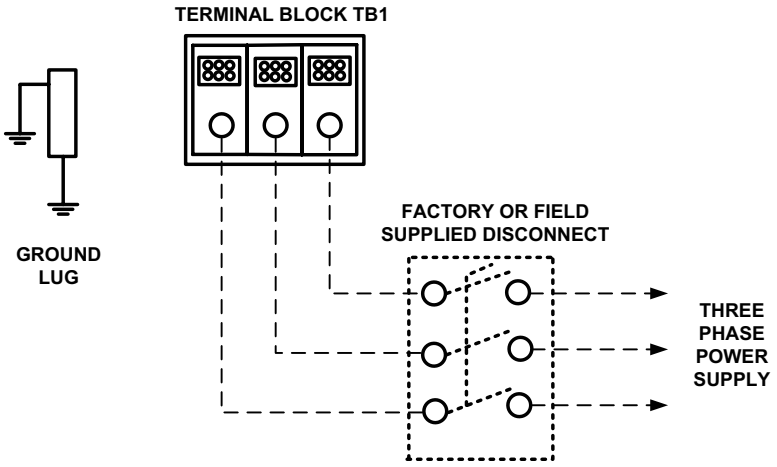


FIGURE 24 - FIELD WIRING DISCONNECT - COOLING UNIT WITH/WITHOUT ELECTRIC HEAT

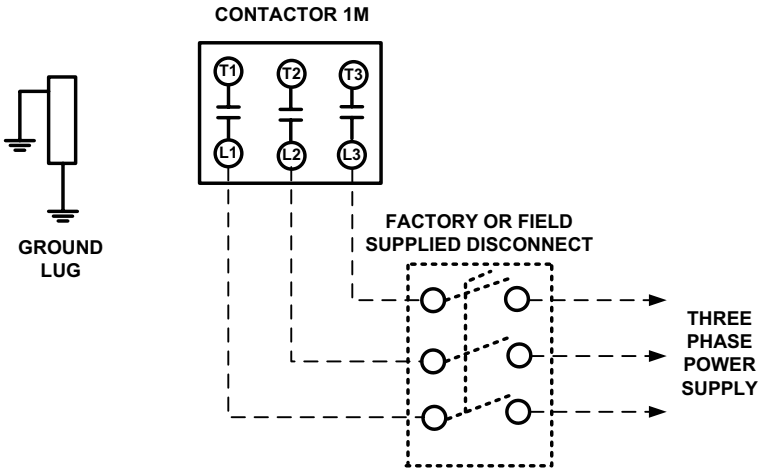


FIGURE 25 - FIELD WIRING DISCONNECT-COOLING UNIT WITH GAS HEAT

TABLE 8: ELECTRICAL DATA - DR090 WITHOUT POWERED CONVENIENCE OUTLET

Voltage	Compressors		OD Fan Motors	Supply Blower Motor FLA		Pwr Exh Motor	Pwr Conv Outlet	Electric Heater Model No.	Actual KW	Heater Amps	Min. Circuit Ampacity (Amps)		MCA w/Power Exhaust (Amps)		Max Fuse* Size (Amps)		Max Fuse Size w/Power Exhaust (Amps)	
	RLA	LRA	FLA	1.5	2	FLA	FLA				1.5	2	1.5	2	1.5	2	1.5	2
	ea.	ea.	ea.	HP	HP						HP	HP	HP	HP	HP	HP	HP	HP
208	13.1	110.0	1.5	6.2	8.2	5.5	0.0	None	--	--	38.7	40.7	44.2	46.2	50	50	50	50
								2TP04520925	6.8	18.9	38.7	40.7	44.2	46.2	50	50	50	50
								2TP04521825	13.5	37.5	54.6	57.1	61.5	64.0	60	60	70	70
								2TP04522425	18	50.0	70.2	72.7	77.1	79.6	80	80	80	80
								2TP04523625	25.5	70.8	96.2	98.7	103.1	105.6	100	100	110	110
230	13.1	110.0	1.5	6.2	8.2	5.5	0.0	None	--	--	38.7	40.7	44.2	46.2	50	50	50	50
								2TP04520925	9	21.7	38.7	40.7	44.2	46.2	50	50	50	50
								2TP04521825	18	43.3	61.9	64.4	68.8	71.3	70	70	70	80
								2TP04522425	24	57.7	79.9	82.4	86.8	89.3	80	90	90	90
								2TP04523625	34	81.8	110.0	112.5	116.9	119.4	110	125	125	125
460	6.7	54.0	0.8	3.1	4.1	2.2	0.0	None	--	--	19.8	20.8	22	23	25	25	25	25
								2TP04520946	9	11.3	19.8	20.8	22	23	25	25	25	25
								2TP04521846	18	22.6	30.9	32.2	33.7	34.9	35	35	35	35
								2TP04522446	24	30.1	40	41.2	42.7	44	40	45	45	45
								2TP04523646	34	42.7	55	56.2	57.7	59	60	60	60	60
575	5.1	44.0	0.6	2.4	3.6	1.8	0.0	None	--	--	15.1	16.3	16.9	18.1	20	20	20	20
								2TP04520958	9	9.0	15.1	16.3	16.9	18.1	20	20	20	20
								2TP04521858	18	18.1	24.7	26.2	26.9	28.4	25	30	30	30
								2TP04522458	24	24.1	31.9	33.4	34.1	35.6	35	35	35	40
								2TP04523658	34	34.1	43.9	45.4	46.1	47.6	45	50	50	50

* Maximum HACR breaker of the same AMP size is applicable.

TABLE 9: ELECTRICAL DATA - DR090 WITH POWERED CONVENIENCE OUTLET

Voltage	Compressors		OD Fan Motors	Supply Blower Motor FLA		Pwr Exh Motor	Pwr Conv Outlet	Electric Heater Model No.	Actual KW	Heater Amps	Min. Circuit Ampacity (Amps)		MCA w/Power Exhaust (Amps)		Max Fuse* Size (Amps)		Max Fuse Size w/Power Exhaust (Amps)	
	RLA	LRA	FLA	1.5	2	FLA	FLA				1.5	2	1.5	2	1.5	2	1.5	2
	ea.	ea.	ea.	HP	HP						HP	HP	HP	HP	HP	HP	HP	HP
208	13.1	110.0	1.5	6.2	8.2	5.5	10.0	None	--	--	48.7	50.7	54.2	56.2	60	60	60	60
								2TP04520925	6.8	18.9	48.7	50.7	54.2	56.2	60	60	60	60
								2TP04521825	13.5	37.5	67.1	69.6	74.0	76.5	70	70	80	80
								2TP04522425	18	50.0	82.7	85.2	89.6	92.1	90	90	90	100
								2TP04523625	25.5	70.8	108.7	111.2	115.6	118.1	110	125	125	125
230	13.1	110.0	1.5	6.2	8.2	5.5	10.0	None	--	--	48.7	50.7	54.2	56.2	60	60	60	60
								2TP04520925	9	21.7	48.7	50.7	54.2	56.7	60	60	60	60
								2TP04521825	18	43.3	74.4	76.9	81.3	83.8	80	80	90	90
								2TP04522425	24	57.7	92.4	94.9	99.3	101.8	100	100	100	110
								2TP04523625	34	81.8	122.5	125.0	129.4	131.9	125	125	150	150
460	6.7	54.0	0.8	3.1	4.1	2.2	5.0	None	--	--	24.8	25.8	27	28	30	30	30	30
								2TP04520946	9	11.3	24.8	25.8	27	28	30	30	30	30
								2TP04521846	18	22.6	37.2	38.4	39.9	41.2	40	40	40	45
								2TP04522446	24	30.1	46.2	47.5	49	50.2	50	50	50	60
								2TP04523646	34	42.7	61.2	62.5	64	65.2	70	70	70	70
575	5.1	44.0	0.6	2.4	3.6	1.8	4.0	None	--	--	19.1	20.3	20.9	22.1	20	25	25	25
								2TP04520958	9	9.0	19.1	20.3	21.1	22.6	20	25	25	25
								2TP04521858	18	18.1	29.7	31.2	31.9	33.4	30	35	35	35
								2TP04522458	24	24.1	36.9	38.4	39.1	40.6	40	40	40	45
								2TP04523658	34	34.1	48.9	50.4	51.1	52.6	50	60	60	60

* Maximum HACR breaker of the same AMP size is applicable.

TABLE 10: ELECTRICAL DATA - DR120 W/O PWRD CONVENIENCE OUTLET

Voltage	Compressors		OD Fan Motors	Supply Blower Motor FLA		Pwr Exh Motor	Pwr Conv Outlet	Electric Heater Model No.	Actual KW	Heater Amps	Min. Circuit Ampacity (Amps)		MCA w/Power Exhaust (Amps)		Max Fuse* Size (Amps)		Max Fuse Size w/Power Exhaust (Amps)	
	RLA	LRA	FLA	2	3	FLA	FLA				2	3	2	3	2	3	2	3
	ea.	ea.	ea.	HP	HP						HP	HP	HP	HP	HP	HP	HP	HP
208	16.0	137.0	3.5	8.2	10.9	5.5	0.0	None	--	--	51.2	53.9	56.7	59.4	60	60	70	70
								2TP04521825	13.5	37.5	57.1	60.5	64.0	67.3	60	70	70	70
								2TP04522425	18	50.0	72.7	76.1	79.6	83.0	80	80	80	90
								2TP04523625	25.5	70.8	98.7	102.1	105.6	109.0	100	110	110	110
								2TP04525425	40.6	112.7	151.1	154.5	158.0	161.4	175	175	175	175
230	16.0	137.0	3.5	8.2	10.9	5.5	0.0	None	--	--	51.2	53.9	56.7	59.4	60	60	70	70
								2TP04521825	18	43.3	64.4	67.8	71.3	74.6	70	70	80	80
								2TP04522425	24	57.7	82.4	85.8	89.3	92.7	90	90	90	100
								2TP04523625	34	81.8	112.5	115.9	119.4	122.7	125	125	125	125
								2TP04525425	54	129.9	140.2	143.5	147.0	150.4	150	175	175	175
460	8.3	69.0	1.6	4.1	5.3	2.2	0.0	None	--	--	26	27.2	28.2	29.4	30	35	35	35
								2TP04521846	18	22.6	32.2	33.7	34.9	36.4	35	35	35	40
								2TP04522446	24	30.1	41.2	42.7	44	45.5	45	45	45	50
								2TP04523646	34	42.7	56.2	57.7	59	60.5	60	60	60	70
								2TP04525446	54	67.8	70.1	71.6	72.8	74.3	80	80	80	80
575	6.4	58.0	1.3	3.6	4.1	1.8	0.0	None	--	--	20.6	21.1	22.4	22.9	25	25	25	25
								2TP04521858	18	18.1	26.2	26.8	28.4	29	30	30	30	30
								2TP04522458	24	24.1	33.4	34	35.6	36.2	35	35	40	40
								2TP04523658	34	34.1	45.4	46	47.6	48.3	50	50	50	50
								2TP04525458	54	54.2	56.5	57.1	58.7	59.3	70	70	70	70

* Maximum HACR breaker of the same AMP size is applicable.

TABLE 11: ELECTRICAL DATA - DR120 W/PWRD CONVENIENCE OUTLET

Voltage	Compressors		OD Fan Motors	Supply Blower Motor FLA		Pwr Exh Motor	Pwr Conv Outlet	Electric Heater Model No.	Actual KW	Heater Amps	Min. Circuit Ampacity (Amps)		MCA w/Power Exhaust (Amps)		Max Fuse* Size (Amps)		Max Fuse Size w/Power Exhaust (Amps)	
	RLA	LRA	FLA	2	3	FLA	FLA				2	3	2	3	2	3	2	3
	ea.	ea.	ea.	HP	HP						HP	HP	HP	HP	HP	HP	HP	HP
208	16.0	137.0	3.5	8.2	10.9	5.5	10.0	None	--	--	61.2	63.9	66.7	69.4	70	70	80	80
								2TP04521825	13.5	37.5	69.6	73.0	76.5	79.8	70	80	80	80
								2TP04522425	18	50.0	85.2	88.6	92.1	95.5	90	90	100	100
								2TP04523625	25.5	70.8	111.2	114.6	118.1	121.5	125	125	125	125
								2TP04525425	40.6	112.7	163.6	167.0	170.5	173.9	175	175	175	175
230	16.0	137.0	3.5	8.2	10.9	5.5	10.0	None	--	--	61.2	63.9	66.7	69.4	70	70	80	80
								2TP04521825	18	43.3	76.9	80.3	83.8	87.1	80	90	90	90
								2TP04522425	24	57.7	94.9	98.3	101.8	105.2	100	100	110	110
								2TP04523625	34	81.8	125.0	128.4	131.9	135.2	125	150	150	150
								2TP04525425	54	129.9	152.7	156.0	159.5	162.9	175	175	175	175
460	8.3	69.0	1.6	4.1	5.3	2.2	5.0	None	--	--	31	32.2	33.2	34.4	35	40	40	40
								2TP04521846	18	22.6	38.4	39.9	41.2	42.7	40	40	45	45
								2TP04522446	24	30.1	47.5	49	50.2	51.7	50	50	60	60
								2TP04523646	34	42.7	62.5	64	65.2	66.7	70	70	70	70
								2TP04525446	54	67.8	76.3	77.8	79.1	80.6	90	90	90	90
575	6.4	58.0	1.3	3.6	4.1	1.8	4.0	None	--	--	24.6	25.1	26.4	26.9	30	30	30	30
								2TP04521858	18	18.1	31.2	31.8	33.4	34	35	35	35	35
								2TP04522458	24	24.1	38.4	39	40.6	41.2	40	40	45	45
								2TP04523658	34	34.1	50.4	51	52.6	53.3	60	60	60	60
								2TP04525458	54	54.2	61.5	62.1	63.7	64.3	70	70	70	70

* Maximum HACR breaker of the same AMP size is applicable.

TABLE 12: ELECTRICAL DATA - DR150 W/O PWRD CONVENIENCE OUTLET

Voltage	Compressors		OD Fan Motors	Supply Blower Motor FLA		Pwr Exh Motor	Pwr Conv Outlet	Electric Heater Model No.	Actual KW	Heater Amps	Min. Circuit Ampacity (Amps)		MCA w/Power Exhaust (Amps)		Max Fuse* Size (Amps)		Max Fuse Size w/Power Exhaust (Amps)	
	RLA	LRA	FLA	3	5	FLA	FLA				3	5	3	5	3	5	3	5
	ea.	ea.	ea.	HP	HP						HP	HP	HP	HP	HP	HP	HP	HP
208	20.0	146.0	1.5	10.9	16.1	5.5	0.0	None	--	--	61.9	67.1	67.4	72.6	80	80	80	90
								2TP04521825	13.5	37.5	61.9	67.1	67.4	73.8	80	80	80	90
								2TP04522425	18	50.0	76.1	82.6	83.0	89.5	80	90	90	90
								2TP04523625	25.5	70.8	102.1	108.6	109.0	115.5	110	110	110	125
								2TP04525425	40.6	112.7	154.5	161.0	161.4	167.9	175	175	175	175
230	20.0	146.0	1.5	10.9	16.1	5.5	0.0	None	--	--	61.9	67.1	67.4	72.6	80	80	80	90
								2TP04521825	18	43.3	67.8	74.3	74.6	81.1	80	80	80	90
								2TP04522425	24	57.7	85.8	92.3	92.7	99.2	90	100	100	100
								2TP04523625	34	81.8	115.9	122.4	122.7	129.2	125	125	125	150
								2TP04525425	54	129.9	143.5	150.0	150.4	156.9	175	175	175	175
460	8.4	73.0	0.8	5.3	8.1	2.2	0.0	None	--	--	27.4	30.2	29.6	32.4	35	35	35	40
								2TP04521846	18	22.6	33.7	37.2	36.4	39.9	35	40	40	40
								2TP04522446	24	30.1	42.7	46.2	45.5	49	45	50	50	50
								2TP04523646	34	42.7	57.7	61.2	60.5	64	60	70	70	70
								2TP04525446	54	67.8	71.6	75.1	74.3	77.8	80	90	80	90
575	7.1	60.0	0.6	4.1	6.0	1.8	0.0	None	--	--	22.5	24.4	24.3	26.2	25	30	30	30
								2TP04521858	18	18.1	26.8	29.2	29	31.4	30	30	30	35
								2TP04522458	24	24.1	34	36.4	36.2	38.6	35	40	40	40
								2TP04523658	34	34.1	46	48.4	48.3	50.6	50	50	50	60
								2TP04525458	54	54.2	57.1	59.5	59.3	61.7	70	70	70	70

* Maximum HACR breaker of the same AMP size is applicable.

TABLE 13: ELECTRICAL DATA - DR150 W/PWRD CONVENIENCE OUTLET

Voltage	Compressors		OD Fan Motors	Supply Blower Motor FLA		Pwr Exh Motor	Pwr Conv Outlet	Electric Heater Model No.	Actual KW	Heater Amps	Min. Circuit Ampacity (Amps)		MCA w/Power Exhaust (Amps)		Max Fuse* Size (Amps)		Max Fuse Size w/Power Exhaust (Amps)	
	RLA	LRA	FLA	3	5	FLA	FLA				3	5	3	5	3	5	3	5
	ea.	ea.	ea.	HP	HP						HP	HP	HP	HP	HP	HP	HP	HP
208	20.0	146.0	1.5	10.9	16.1	5.5	10.0	None	--	--	71.9	77.1	77.4	82.6	90	90	90	100
								2TP04521825	13.5	37.5	73.0	79.5	79.8	86.3	90	90	90	100
								2TP04522425	18	50.0	88.6	95.1	95.5	102.0	90	100	100	110
								2TP04523625	25.5	70.8	114.6	121.1	121.5	128.0	125	125	125	150
								2TP04525425	40.6	112.7	167.0	173.5	173.9	180.4	175	175	175	200
230	20.0	146.0	1.5	10.9	16.1	5.5	10.0	None	--	--	71.9	77.1	77.4	82.6	90	90	90	100
								2TP04521825	18	43.3	80.3	86.8	87.1	93.6	90	90	90	100
								2TP04522425	24	57.7	98.3	104.8	105.2	111.7	100	110	110	125
								2TP04523625	34	81.8	128.4	134.9	135.2	141.7	150	150	150	150
								2TP04525425	54	129.9	156.0	162.5	162.9	169.4	175	175	175	175
460	8.4	73.0	0.8	5.3	8.1	2.2	5.0	None	--	--	32.4	35.2	34.6	37.4	40	40	40	45
								2TP04521846	18	22.6	39.9	43.4	42.7	46.2	40	45	45	50
								2TP04522446	24	30.1	49	52.5	51.7	55.2	50	60	60	60
								2TP04523646	34	42.7	64	67.5	66.7	70.2	70	70	70	80
								2TP04525446	54	67.8	77.8	81.3	80.6	84.1	90	90	90	90
575	7.1	60.0	0.6	4.1	6.0	1.8	4.0	None	--	--	26.5	28.4	28.3	30.2	30	35	35	35
								2TP04521858	18	18.1	31.8	34.2	34	36.4	35	35	35	40
								2TP04522458	24	24.1	39	41.4	41.2	43.6	40	45	45	45
								2TP04523658	34	34.1	51	53.4	53.3	55.6	60	60	60	60
								2TP04525458	54	54.2	62.1	64.5	64.3	66.7	70	70	70	70

* Maximum HACR breaker of the same AMP size is applicable.

TABLE 14: PHYSICAL DATA

Component		Models		
		90	120	150
Evaporator Blower	Blower, Centrifugal (Dia. X Wd. In.)	15 x 15	15 x 15	15 x 15
	Motor, Standard (HP)	1-1/2	2	3
	Motor, Optional (HP)	2	3	5
Evaporator Coil	Rows	3	4	4
	Fins per Inch	15	15	15
	Height (in.)	32	40	40
	Face Area (ft.2)	10.6	13.2	13.2
Reheat Coil	Rows	2	2	2
	Fins per Inch	13	13	13
	Height (in.)	28	36	36
	Face Area (ft.2)	7.8	10	10
Condenser Fan	Quantity	2	2	4
	Propeller Dia. (in., each)	24	24	24
	Motor (HP, each)	1/3	3/4	1/3
	CFM, Nominal (each)	3400	4400	3500
Condenser Coil	Number of Coils	2	2	4
	Rows (each)	1	2	2
	Fins per Inch	20	20	15
	Height (in., each)	44	44	36
	Face Area (ft.2 each)	14.5	14.5	11.9
Refrigerant Charge	System 1 (lb./oz.)	8/0	12/12	22/8
	System 2 (lb./oz.)	6/6	10/2	21/4
Compressors	Quantity	2	2	2
	Type	Recip.	Recip.	Scroll
Air Filters	Size (Wd. X Ht. X Thickness in.)	25 x 20 x 2	25 x 20 x 2	25 x 20 x 2
	Quantity	4	4	4

OPTIONAL ELECTRIC HEAT

The factory-installed heaters are wired for single point power supply. Power supply need only be brought into the single point terminal block.

These CSA approved heaters are located within the central compartment of the unit with the heater elements extending in to the supply air chamber.

Fuses are supplied, where required, by the factory. Some kW sizes require fuses and others do not. refer to Table 15 for minimum CFM limitations and to Tables 8 through 13 for electrical data.

TABLE 15: MINIMUM SUPPLY AIR CFM

Heater	Unit			
kW	Voltage	090	120	150
		Minimum Supply Air CFM		
9	208/230	2250	N/A	N/A
18		2250	3000	3750
24		2250	3000	3750
36		2250	3000	3750
54		N/A	3000	3750
9	480	2250	N/A	N/A
18		2250	3000	3750
24		2250	3000	3750
36		2250	3000	3750
54		N/A	3000	3750
9	600	2250	N/A	N/A
18		2250	3000	3750
24		2250	3000	3750
36		2250	3000	3750
54		N/A	3000	3750

OPTIONAL GAS HEAT

These gas-fired heaters have aluminized-steel or optional stainless steel, tubular heat exchangers with spark ignition.

TABLE 16: GAS APPLICATION DATA

Unit	Opt.	Input (MBH)	Output (MBH)	Temp Rise (°F)
090	10	120	96	15-45
	15	180	144	30-60
120	15	180	144	20-50
	20	240	192	30-60
150	15	180	144	10-40
	20	240	192	20-50

GAS PIPING

Proper sizing of gas piping depends on the cubic feet per hour of gas flow required, specific gravity of the gas and the length of run. "National Fuel Gas Code" Z223.1 (in U.S.A.) or the current Gas Installation Codes CSA-B149.1 (in Canada) should be followed in all cases unless superseded by local codes or gas utility requirements. Refer to the Pipe Sizing Table 17. The heating value of the gas may differ with locality. The value should be checked with the local gas utility.

NOTE: There may be a local gas utility requirement specifying a minimum diameter for gas piping. All units require a one-inch pipe connection at the entrance fitting.

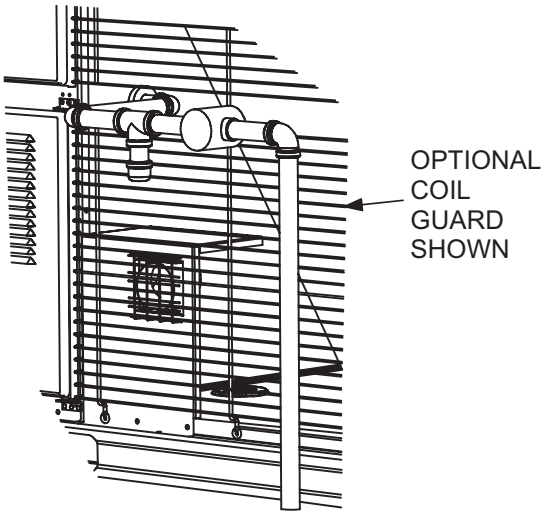


FIGURE 26 - SIDE ENTRY GAS PIPING

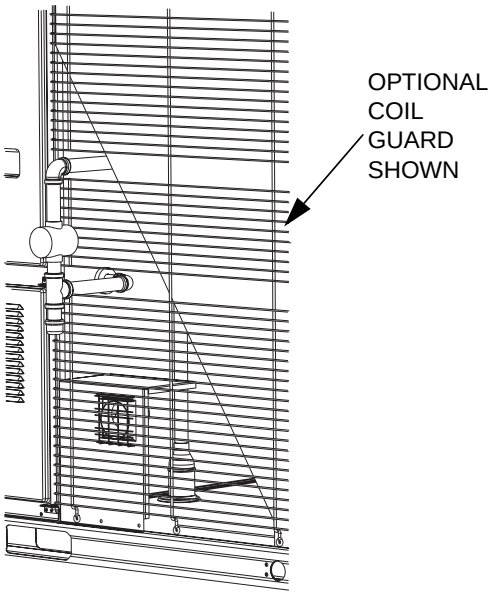


FIGURE 27 - BOTTOM ENTRY GAS PIPING

TABLE 17: GAS PIPE SIZING - CAPACITY OF PIPE

Length of Pipe (ft.)	Nominal Iron Pipe Size		
	3/4 in.	1 in.	1-1/4 in.
10	278	520	1050
20	190	350	730
30	152	285	590
40	130	245	500
50	115	215	440
60	105	195	400
70	96	180	370
80	90	170	350
90	84	160	320
100	79	150	305

NOTE: Maximum capacity of pipe in cubic feet of gas per hour based upon a pressure drop of 0.3 inch W.C. and 0.6 specific gravity gas.

NOTE: There may be a local gas utility requirement specifying a minimum diameter for gas piping. All units require a 3/4 inch pipe connection at the entrance fitting. Line should not be sized smaller than the entrance fitting size.

GAS CONNECTION

The gas supply line can be routed within the space and roof curb, exiting through the unit's basepan. Refer to Figure 14 for the gas piping inlet location. Typical supply piping arrangements are shown in Figures 26 and 27. All pipe nipples, fittings, and the gas cock are field supplied or may be purchased in UPG accessory kit #1GP0404.

Gas piping recommendations:

1. A drip leg and a ground joint union must be installed in the gas piping.
2. Where required by local codes, a manual shut-off valve must be installed outside of the unit.
3. Use wrought iron or steel pipe for all gas lines. Pipe dope should be applied sparingly to male threads only.

⚠WARNING

Natural gas may contain some propane. Propane is an excellent solvent and will quickly dissolve white lead and most standard commercial compounds. A special pipe dope must be used when assembling wrought iron or steel pipe. Shellac based compounds such as Gaskolac or Stalastic, and compounds such as Rectorseal #5, Clydes's or John Crane may be used.

4. All piping should be cleaned of dirt and scale by hammering on the outside of the pipe and blowing out loose particles. Before initial start-up, be sure that all gas lines external to the unit have been purged of air.
5. The gas supply should be a separate line and installed in accordance with all safety codes as prescribed under "Limitations".
6. A 1/8-inch NPT plugged tapping, accessible for test gage connection, must be installed immediately upstream of the gas supply connection to the unit.
7. After the gas connections have been completed, open the main shut-off valve admitting *normal gas pressure* to the mains. *Check all joints for leaks with soap solution or other material suitable for the purpose.* **NEVER USE A FLAME**.

⚠WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warning exactly could result in serious injury, death or property damage.

Never test for gas leaks with an open flame. use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.

⚠ CAUTION

The furnace and its individual shut-off valve must be disconnected from the gas supply piping system during any pressure testing at pressures in excess of 1/2 PSIG.

Pressures greater than 1/2 PSIG will cause gas valve damage resulting in a hazardous condition. If it is subjected to a pressure greater than 1/2 PSIG, the gas valve must be replaced.

The furnace must be isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 PSIG.

⚠WARNING

Threaded joints should be coated with a sealing compound that is resistant to the action of liquefied petroleum gases. **Do not use Teflon tape.**

LP UNITS, TANKS AND PIPING

All gas heat units are shipped from the factory equipped for natural gas use only. The unit may be converted in the field for use with LP gas with accessory kit model number 1NP0441.

All LP gas equipment must conform to the safety standards of the National Fire Protection Association.

For satisfactory operation, LP gas pressure must be 10.5 inch W.C. at the unit under full load. Maintaining proper gas pressure depends on three main factors:

1. The vaporization rate which depends on the temperature of the liquid and the “wetted surface” area of the container(s).

2. The proper pressure regulation. (Two-stage regulation is recommended).

3. The pressure drop in the lines between regulators and between the second stage regulator and the appliance. Pipe size required will depend on the length of the pipe run and the total load of all appliances.

Complete information regarding tank sizing for vaporization, recommended regulator settings, and pipe sizing is available from most regulator manufacturers and LP gas suppliers.

LP gas is an excellent solvent and will quickly dissolve white lead and most standard commercial compounds. A special pipe dope must be used when assembling wrought iron or steel pipe for LP. Shellac base compounds such as Gaskolac or Stalastic, and compounds such as Rectorseal #5, Clyde’s, or John Crane may be used.

Check all connections for leaks when piping is completed using a soap solution. **NEVER USE A FLAME**.

⚠WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warning exactly could result in serious injury, death or property damage.

Never test for gas leaks with an open flame. use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.

VENT AND COMBUSTION AIR

Venting slots in the heating compartment access panel remove the need for a combustion air hood. The gas heat flue exhaust is routed through factory installed exhaust piping with screen. If necessary, a flue exhaust extension may be installed at the point of installation.

OPTIONS/ACCESSORIES

ELECTRIC HEAT

Electric heaters are available as factory-installed options or field-installed accessories. Refer to electric heat instructions for installation. These heaters mount in the heat compartment with the heating elements extending into the supply air chamber. All electric heaters are fused and intended for use with single point power supply.

MOTORIZED OUTDOOR DAMPER

The Motorized Outdoor Damper can be a factory installed option or a field installed accessory. If factory installed, refer to the instructions included with the outdoor air hood to complete the assembly. Field installed Motorized Outdoor Damper accessories include complete instructions for installation.

ECONOMIZER

The Economizer can be a factory installed option or a field installed accessory. If factory installed, refer to the instructions included with the outdoor air hood to complete the assembly. Field installed Economizer accessories include complete instructions for installation.

There are two Economizer options:

1. Down Flow application with barometric relief hood standard.

2. Horizontal Flow application that requires the purchase of a barometric relief hood.

POWER EXHAUST

The Power Exhaust can be a factory installed option or a field installed accessory. If factory installed, refer to the instructions included with the outdoor air hood to complete the assembly. Field installed Power Exhaust accessories include complete instructions for installation.

The Power Exhaust factory installed option is for Down Flow application only.

There are two field installed Power Exhaust accessories:

1. Down Flow application.

2. Horizontal Flow application that requires the purchase of a barometric relief hood.

RAIN HOOD

All of the hood components, including the filters, the gasketing and the hardware for assembling, are packaged and located between the condenser coil section and the main unit cabinet, if the unit has factory installed options. If field installed accessories are being installed all parts necessary for the installation comes in the accessory.

ECONOMIZER AND POWER EXHAUST SET POINT ADJUSTMENTS AND INFORMATION

Remove the top rear access panel from the unit. Locate the economizer control module, where the following adjustments will be made.

⚠ CAUTION

Extreme care must be exercised in turning all set point, maximum and minimum damper positioning adjustment screws to prevent twisting them off.

MINIMUM POSITION ADJUSTMENT

- Check that the damper blades move smoothly without binding; carefully turn the Minimum Position Adjust screw (found on the damper control module) fully clockwise and then set the thermostat indoor fan switch to the ON position and then OFF or energize and de-energize terminals “R” to “G”.
- With the thermostat set to the indoor fan ON position or terminals “R” to “G” energized, turn the Minimum Position Adjusting screw (located on the damper control module) counterclockwise until the desired minimum damper position has been attained.

ENTHALPY SET POINT ADJUSTMENT

The enthalpy set point may now be set by selecting the desired set point shown in the Enthalpy Set Point Adjustment Figure 28. Adjust as follows:

- For a single enthalpy operation carefully turn the set point adjusting screw (found on the damper control module) to the "A", "B", "C" or "D" setting corresponding to the lettered curve of the Enthalpy Set Point Adjustment Figure 28.
- For a dual enthalpy operation, carefully turn the set point adjusting screw fully clockwise past the "D" setting.

POWER EXHAUST DAMPER SET POINT (WITH OR WITHOUT POWER EXHAUST)

- With no power exhaust option, adjust the Exhaust Air Adjustment Screw fully clockwise. This will allow 2nd stage cooling to operate.
- With power exhaust option, each building pressurization requirement will be different. The point at which the power exhaust comes on is determined by the economizer damper position (Percent Open). The Exhaust Air Adjustment Screw should be set at the Percent Open of the economizer damper at which the power exhaust is needed. It can be set from 0 to 100% damper open.

INDOOR AIR QUALITY AQ

Indoor Air Quality (indoor sensor input): Terminal AQ accepts a +2 to +10 Vdc signal with respect to the (AQ1) terminal. When the signal is below it's set point, the actuator is allowed to modulate normally in accordance with the enthalpy and mixed air sensor inputs. When the AQ signal exceeds it's set point setting and there is no call for free cooling, the actuator is proportionately modulated from the 2 to 10 Vdc signal, with 2 Vdc corresponding to full closed and 10 Vdc corresponding to full open. When there is no call for free cooling, the damper position is limited by the IAQ Max damper position setting. When the signal exceeds it's set point (Demand Control Ventilation Set Point) setting and there is a call for free cooling, the actuator modulates from the minimum position to the full open position based on the highest call from either the mixed air sensor input or the AQ voltage input.

- Optional CO_2 Space Sensor Kit Part # 2AQ04700324
- Optional CO_2 Sensor Kit Part # 2AQ04700424

Replace the top rear access panel on the unit.

CONTROL CURVE	CONTROL POINT APPROX. ^{0}F (^{0}C) AT 50% RH
A	73 (23)
B	70 (21)
C	67 (19)
D	63 (17)

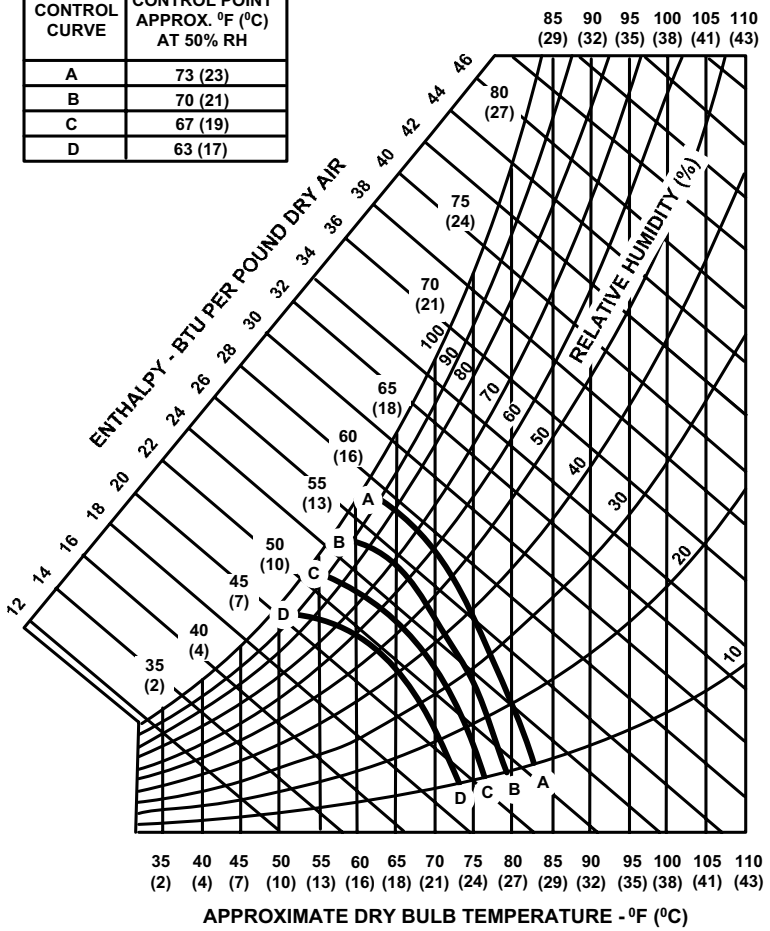


FIGURE 28 - ENTHALPY SET POINT CHART

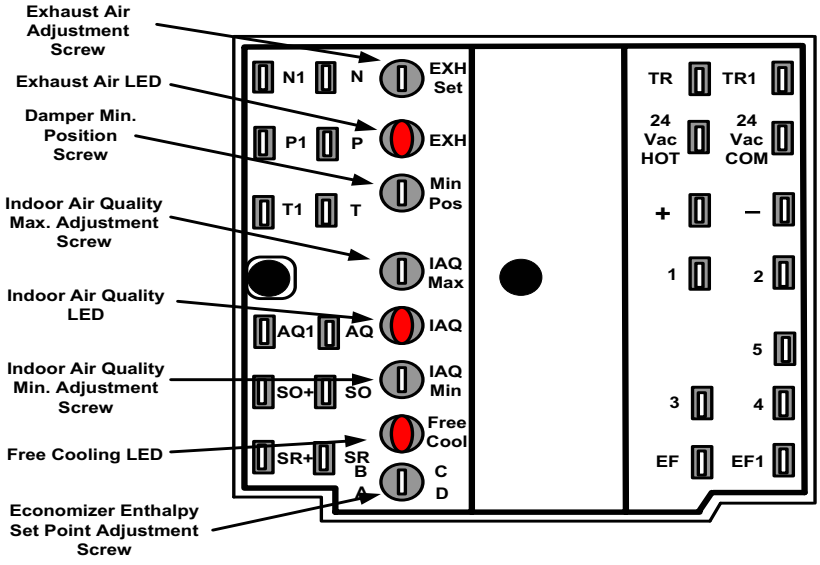


FIGURE 29 - HONEYWELL ECONOMIZER CONTROL W7212

PHASING

Predator MagnaDRY™ DR units are properly phased from the factory. If the unit does not start up, the electrical connection to the unit may be misphased. If unit is equipped with a Phase Monitor check the phase monitor for a Red LED, indicating a misphase. Change the phasing of the **Field line connection at the Factory or Field Supplied Disconnect** to obtain a Green LED on the Phase Monitor. (Scroll compressors operate in only one direction. If the scroll is drawing low amperage, has similar suction and discharge pressures, or producing a high noise level, the scroll is misphased.)

⚠ CAUTION

Scroll compressors require proper rotation to operate correctly. Units are properly phased at the factory. Do not change the internal wiring to make the blower condenser fans, or compressor rotate correctly.

BLOWER ROTATION

Check for proper supply air blower rotation. If the blower is rotating backwards, the line voltage at the unit point of power connection is misphased (See 'PHASING').

TABLE 18: SUPPLY AIR LIMITATIONS

Unit	Minimum	Maximum
090	2250	3750
120	3000	5000
150	3750	6250

BELT TENSION

The tension on the belt should be adjusted as shown in Figure 30.

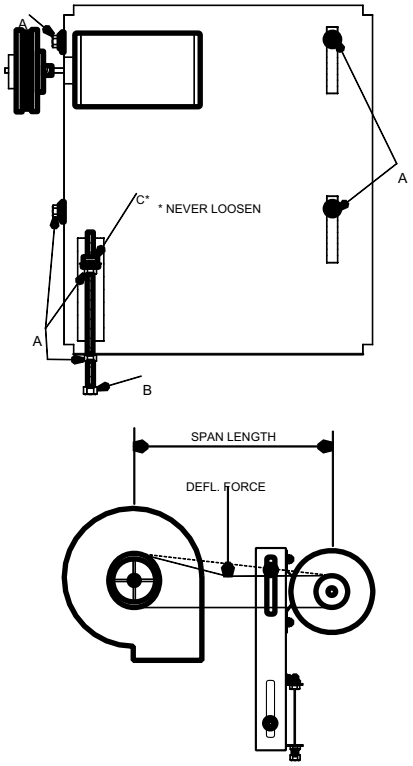


FIGURE 30 - BELT ADJUSTMENT

⚠ CAUTION

Procedure for adjusting belt tension:

1. Loosen six nuts (top and bottom) A.
2. Adjust by turning (B).
3. Never loosen nuts (C).
4. Use belt tension checker to apply a perpendicular force to one belt at the midpoint of the span as shown. Deflection distance of 4mm (5/32") is obtained.

To determine the deflection distance from normal position, use a straight edge from sheave to sheave as reference line. The recommended deflection force is as follows:

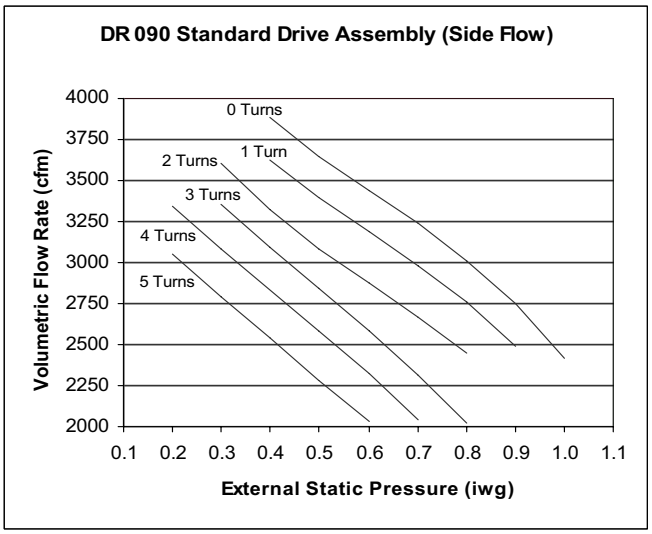
Tension new belts at the max. deflection force recommended for the belt section. Check the belt tension at least two times during the first 24 hours of operation. Any retensioning should fall between the min. and max. deflection force values.

5. After adjusting retighten nuts (A).

TABLE 19: BLOWER PERFORMANCE DR090 SIDE FLOW

DR090 Standard Drive Assembly (Side Flow)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	3342	725	1038	1.11	3048	711	912	0.98
0.3	----	----	----	----	----	----	----	----	3609	775	1283	1.38	3350	748	1125	1.21	3085	727	984	1.06	2791	713	858	0.92
0.4	3885	848	1585	1.70	3629	809	1395	1.50	3319	776	1222	1.31	3098	750	1064	1.14	2833	729	923	0.99	2539	714	797	0.86
0.5	3647	849	1517	1.63	3391	810	1328	1.42	3081	777	1155	1.24	2846	751	997	1.07	2580	730	856	0.92	2286	715	730	0.78
0.6	3439	850	1444	1.55	3182	811	1254	1.35	2872	779	1081	1.16	2586	752	923	0.99	2320	731	782	0.84	2026	717	656	0.70
0.7	3235	852	1363	1.46	2979	813	1174	1.26	2669	780	1000	1.07	2312	753	843	0.90	2047	733	701	0.75	----	----	----	----
0.8	3012	853	1276	1.37	2756	815	1087	1.17	2446	782	913	0.98	2019	755	756	0.81	----	----	----	----	----	----	----	----
0.9	2748	856	1182	1.27	2492	817	993	1.06	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1	2417	859	1081	1.16	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	0 Turns Open				1 Turn Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open			

DR090 Optional Drive Assembly (Side Flow)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	4437	866	1859	1.99	4062	825	1599	1.72
0.4	----	----	----	----	----	----	----	----	----	----	----	----	4572	907	2074	2.23	4209	867	1783	1.91	3834	826	1522	1.63
0.5	----	----	----	----	----	----	----	----	----	----	----	----	4356	909	1992	2.14	3993	869	1701	1.82	3618	827	1440	1.54
0.6	----	----	----	----	----	----	----	----	----	----	----	----	4149	910	1905	2.04	3786	871	1613	1.73	3411	829	1353	1.45
0.7	----	----	----	----	----	----	----	----	4286	951	2134	2.29	3945	913	1812	1.94	3582	873	1520	1.63	3207	831	1260	1.35
0.8	----	----	----	----	----	----	----	----	4123	954	2036	2.18	3740	915	1713	1.84	3377	875	1422	1.53	3002	834	1161	1.25
0.9	----	----	----	----	----	----	----	----	3962	957	1932	2.07	3529	918	1609	1.73	3166	878	1318	1.41	2791	837	1057	1.13
1	----	----	----	----	4115	997	2176	2.33	3798	960	1822	1.96	3307	921	1500	1.61	2944	881	1208	1.30	----	----	----	----
1.1	----	----	----	----	3945	1000	2061	2.21	3629	963	1707	1.83	3070	925	1384	1.49	2706	885	1093	1.17	----	----	----	----
1.2	----	----	----	----	3766	1004	1940	2.08	3450	967	1587	1.70	2812	928	1264	1.36	----	----	----	----	----	----	----	----
1.3	3822	1043	2199	2.36	3573	1007	1814	1.95	3257	970	1460	1.57	----	----	----	----	----	----	----	----	----	----	----	----
1.4	3611	1047	2067	2.22	3362	1011	1682	1.80	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	0 Turns Open				1 Turn Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open			



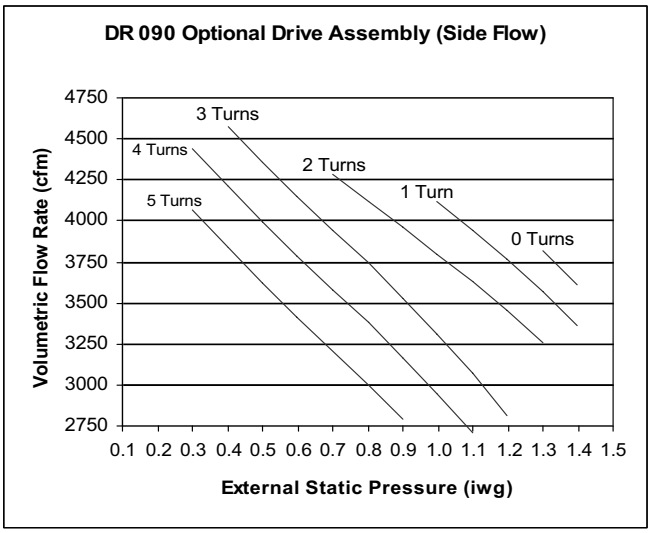
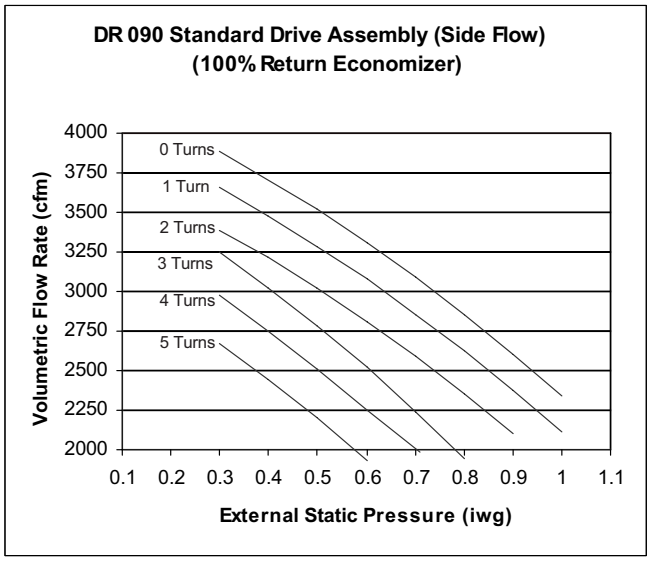


TABLE 20: BLOWER PERFORMANCE DR090 SIDE FLOW ECONOMIZER

DR090 Standard Drive Assembly (Side Flow) (100% Return Economizer)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.3	3886	846	1588	1.70	3655	807	1408	1.51	3388	774	1242	1.33	3252	747	1090	1.17	2979	726	952	1.02	2670	712	828	0.89
0.4	3709	847	1530	1.64	3478	808	1350	1.45	3211	775	1184	1.27	3027	748	1032	1.11	2754	727	894	0.96	2445	713	769	0.83
0.5	3517	848	1468	1.57	3286	809	1288	1.38	3019	776	1122	1.20	2782	749	970	1.04	2509	729	832	0.89	2199	714	707	0.76
0.6	3310	849	1401	1.50	3079	810	1221	1.31	2811	777	1055	1.13	2518	751	903	0.97	2245	730	765	0.82	1936	715	641	0.69
0.7	3088	851	1329	1.43	2857	812	1149	1.23	2590	779	983	1.05	2237	752	831	0.89	1964	731	693	0.74				
0.8	2853	853	1250	1.34	2622	814	1070	1.15	2354	781	904	0.97	1940	754	752	0.81								
0.9	2605	855	1164	1.25	2373	816	984	1.06	2106	783	818	0.88												
1	2343	858	1070	1.15	2112	819	890	0.95																
	0 Turns Open				1 Turn Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open			

DR090 Optional Drive Assembly (Side Flow) (100% Return Economizer)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.3	----	----	----	----	----	----	----	----	----	----	----	----	4651	913	2124	2.28	4331	871	1846	1.98	3990	828	1595	1.71
0.4	----	----	----	----	----	----	----	----	----	----	----	----	4434	912	2037	2.18	4114	871	1759	1.89	3772	828	1508	1.62
0.5	----	----	----	----	----	----	----	----	----	----	----	----	4232	913	1948	2.09	3912	871	1670	1.79	3571	828	1419	1.52
0.6	----	----	----	----	----	----	----	----	4319	954	2161	2.32	4040	914	1857	1.99	3720	873	1580	1.69	3379	829	1328	1.42
0.7	----	----	----	----	----	----	----	----	4159	955	2068	2.22	3852	916	1764	1.89	3532	874	1486	1.59	3190	831	1235	1.32
0.8	----	----	----	----	----	----	----	----	3996	958	1972	2.12	3660	918	1668	1.79	3340	876	1391	1.49	2999	833	1139	1.22
0.9	----	----	----	----	4137	998	2202	2.36	3825	960	1873	2.01	3459	920	1569	1.68	3139	879	1291	1.39	2797	835	1040	1.12
1	----	----	----	----	3949	1000	2100	2.25	3637	962	1770	1.90	3242	923	1466	1.57	2922	881	1189	1.28	----	----	----	----
1.1	----	----	----	----	3738	1003	1993	2.14	3427	965	1663	1.78	3002	925	1360	1.46	----	----	----	----	----	----	----	----
1.2	----	----	----	----	3498	1005	1882	2.02	3186	967	1553	1.67	----	----	----	----	----	----	----	----	----	----	----	----
	0 Turns Open				1 Turn Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open			



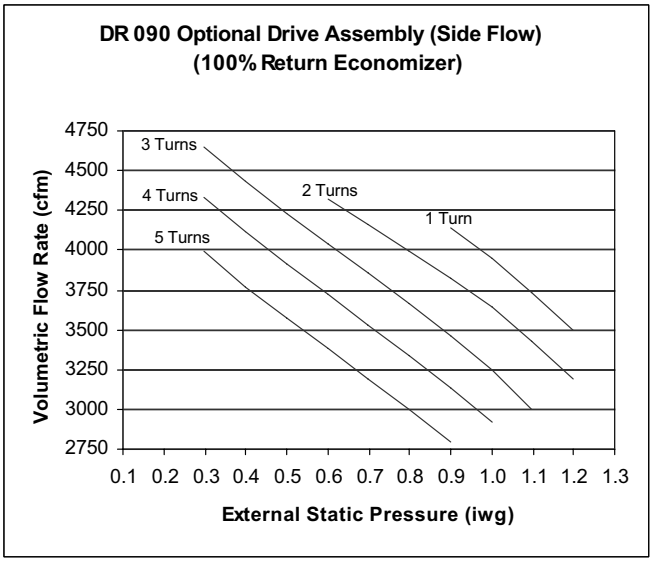
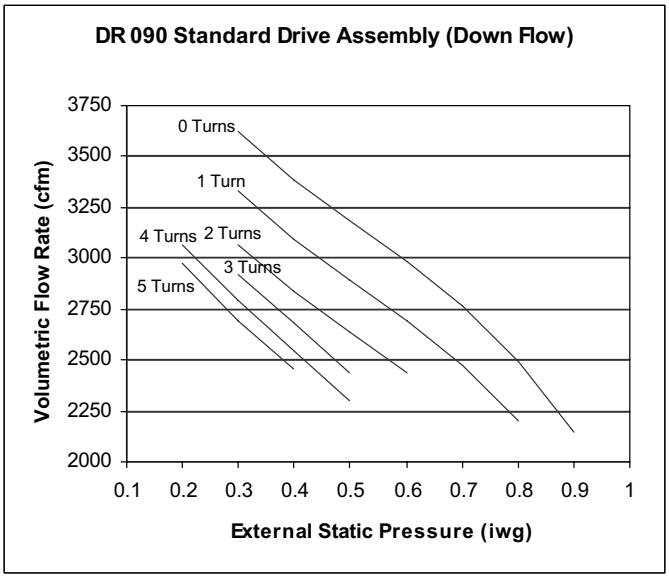


TABLE 21: BLOWER PERFORMANCE DR090 DOWN FLOW

DR090 Standard Drive Assembly (Down Flow)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	3066	728	1044	1.12	2975	711	993	1.07
0.3	3619	853	1468	1.57	3328	814	1303	1.40	3071	781	1166	1.25	2922	752	1058	1.13	2788	729	978	1.05	2697	711	927	0.99
0.4	3385	854	1402	1.50	3094	815	1237	1.33	2837	782	1100	1.18	2681	753	992	1.06	2547	730	913	0.98	2455	712	862	0.92
0.5	3182	855	1334	1.43	2891	816	1169	1.25	2634	783	1032	1.11	2435	755	924	0.99	2301	732	845	0.91	----	----	----	----
0.6	2985	857	1261	1.35	2694	818	1096	1.18	2437	785	960	1.03	----	----	----	----	----	----	----	----	----	----	----	----
0.7	2764	859	1181	1.27	2473	820	1016	1.09	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
0.8	2494	861	1092	1.17	2203	822	927	0.99	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
0.9	2147	864	990	1.06	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	0 Turns Open				1 Turn Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open			

DR090 Optional Drive Assembly (Down Flow)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.3	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	3985	863	1656	1.8	3738	831	1488	1.6
0.4	----	----	----	----	----	----	----	----	4230	936	1987	2.13	3986	898	1762	1.89	3737	864	1586	1.7	3490	832	1418	1.5
0.5	----	----	----	----	----	----	----	----	4013	937	1893	2.03	3752	900	1681	1.80	3503	865	1505	1.6	3256	833	1337	1.4
0.6	----	----	----	----	4086	978	2062	2.21	3803	938	1801	1.93	3532	901	1592	1.71	3283	866	1416	1.5	3035	834	1249	1.3
0.7	----	----	----	----	3885	979	1973	2.12	3602	940	1712	1.84	3326	903	1502	1.61	3078	868	1326	1.4	2830	836	1158	1.2
0.8	3977	1023	2189	2.35	3692	981	1886	2.02	3410	942	1625	1.74	3136	905	1415	1.52	2887	870	1239	1.3	----	----	----	----
0.9	3794	1025	2102	2.26	3509	983	1799	1.93	3226	944	1538	1.65	2962	907	1335	1.43	----	----	----	----	----	----	----	----
1	3619	1027	2015	2.16	3335	985	1712	1.84	3052	946	1451	1.56	----	----	----	----	----	----	----	----	----	----	----	----
1.1	3455	1029	1926	2.07	3170	987	1623	1.74	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1.2	3300	1031	1835	1.97	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	0 Turns Open				1 Turn Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open			



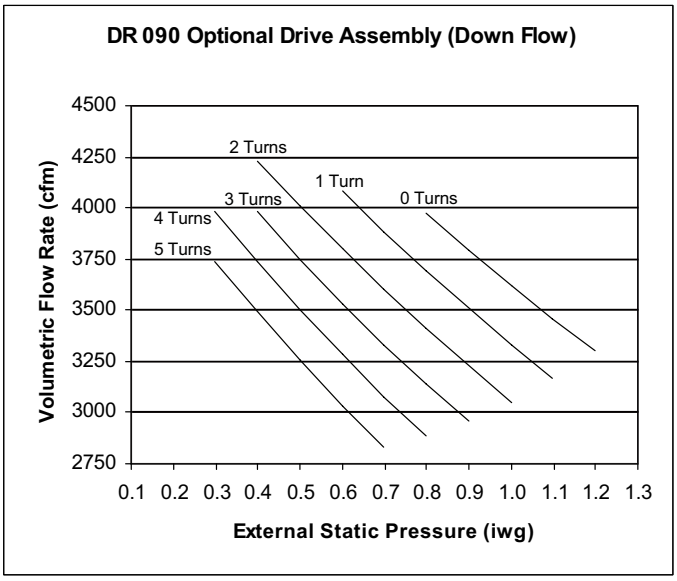
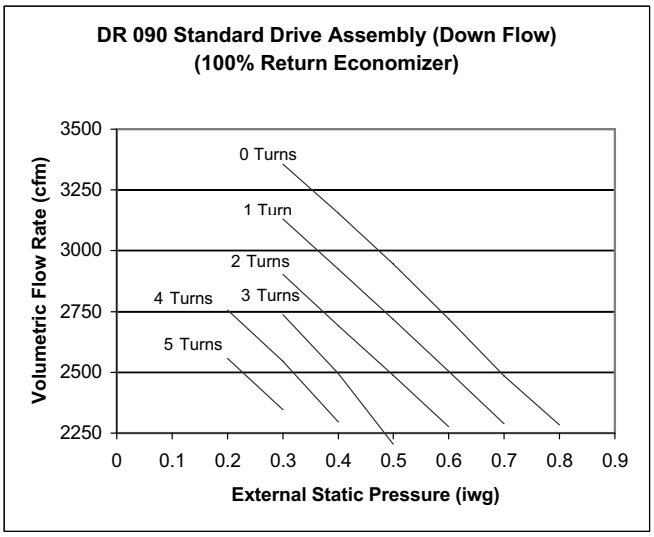


TABLE 22: BLOWER PERFORMANCE DR090 DOWN FLOW ECONOMIZER

DR090 Optional Drive Assembly (Down Flow) (100% Return Economizer)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.2	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	2755	729	970	1.04	2557	712	890	0.95
0.3	3355	854	1393	1.49	3132	815	1249	1.34	2903	781	1120	1.20	2737	753	1008	1.08	2544	730	912	0.98	2347	713	831	0.89
0.4	3154	855	1324	1.42	2924	816	1181	1.27	2692	782	1053	1.13	2494	754	940	1.01	2296	732	843	0.90	----	----	----	----
0.5	2945	857	1247	1.34	2719	818	1106	1.19	2487	784	978	1.05	2204	756	866	0.93	----	----	----	----	----	----	----	----
0.6	2720	859	1166	1.25	2505	820	1027	1.10	2277	786	901	0.97	----	----	----	----	----	----	----	----	----	----	----	----
0.7	2486	861	1089	1.17	2288	822	954	1.02	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
0.8	2284	863	1029	1.10	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	0 Turns Open				1 Turn Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open			

DR090 Optional Drive Assembly (Down Flow) (100% Return Economizer)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.3	----	----	----	----	----	----	----	----	----	----	----	----	4096	898	1795	1.93	3825	863	1613	1.73	3523	832	1429	1.53
0.4	----	----	----	----	----	----	----	----	4134	936	1945	2.09	3891	899	1731	1.86	3621	864	1548	1.66	3322	832	1361	1.46
0.5	----	----	----	----	4192	977	2109	2.26	3946	937	1864	2.00	3690	900	1657	1.78	3421	865	1473	1.58	3125	834	1286	1.38
0.6	----	----	----	----	4007	978	2028	2.18	3759	938	1782	1.91	3495	901	1577	1.69	3227	867	1392	1.49	2934	835	1205	1.29
0.7	----	----	----	----	3823	980	1946	2.09	3574	940	1700	1.82	3306	903	1493	1.60	3040	868	1309	1.40	2750	837	1122	1.20
0.8	3872	1025	2139	2.30	3643	982	1863	2.00	3392	942	1617	1.73	3127	905	1410	1.51	2861	870	1227	1.32	----	----	----	----
0.9	3698	1027	2055	2.20	3466	984	1778	1.91	3214	944	1532	1.64	2957	907	1333	1.43	----	----	----	----	----	----	----	----
1	3530	1028	1967	2.11	3295	986	1691	1.81	3041	946	1445	1.55	----	----	----	----	----	----	----	----	----	----	----	----
1.1	3368	1030	1876	2.01	3130	988	1601	1.72	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1.2	3214	1032	1780	1.91	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	0 Turns Open				1 Turn Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open			



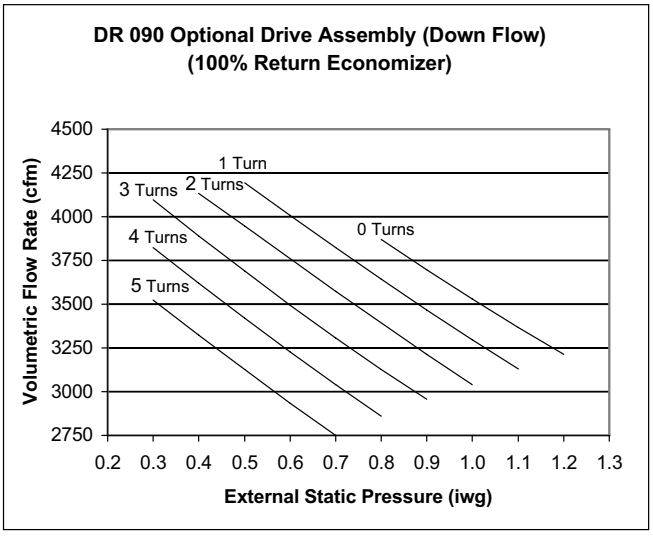
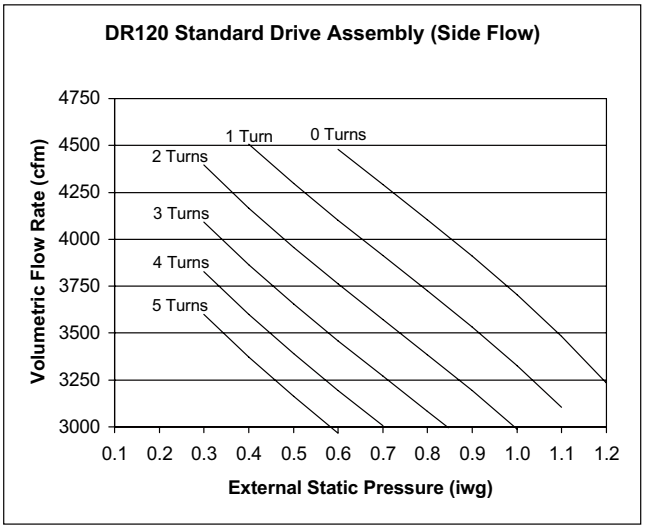


TABLE 23: BLOWER PERFORMANCE DR120 SIDE FLOW

DR120 Standard Drive Assembly (Side Flow)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.3	----	----	----	----	----	----	----	----	4396	856	1837	1.97	4093	817	1600	1.72	3828	779	1401	1.50	3601	740	1240	1.33
0.4	----	----	----	----	4507	896	2044	2.19	4167	857	1768	1.90	3864	818	1531	1.64	3599	780	1332	1.43	3372	741	1171	1.26
0.5	----	----	----	----	4298	897	1969	2.11	3957	858	1693	1.82	3655	819	1456	1.56	3390	781	1257	1.35	3163	742	1096	1.18
0.6	4480	937	2201	2.36	4102	898	1888	2.03	3762	859	1612	1.73	3459	820	1375	1.48	3194	782	1176	1.26	2967	744	1015	1.09
0.7	4291	938	2115	2.27	3914	899	1801	1.93	3573	860	1526	1.64	3271	822	1289	1.38	3006	783	1090	1.17	----	----	----	----
0.8	4104	940	2023	2.17	3726	901	1709	1.83	3386	862	1434	1.54	3083	823	1197	1.28	2818	785	998	1.07	----	----	----	----
0.9	3910	941	1926	2.07	3533	902	1612	1.73	3192	863	1337	1.43	2890	825	1100	1.18	----	----	----	----	----	----	----	----
1	3705	943	1824	1.96	3327	904	1510	1.62	2987	865	1235	1.32	----	----	----	----	----	----	----	----	----	----	----	----
1.1	3482	945	1717	1.84	3104	906	1404	1.51	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1.2	3233	948	1607	1.72	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	0 Turns Open				1 Turns Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open			

DR120 Optional Drive Assembly (Side Flow)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	4539	907	2170	2.33	4095	859	1825	1.96
0.6	----	----	----	----	----	----	----	----	4976	997	2866	3.07	4747	953	2456	2.64	4299	907	2079	2.23	3856	860	1735	1.86
0.7	----	----	----	----	5167	1041	3204	3.44	4820	998	2762	2.96	4522	954	2353	2.52	4074	908	1976	2.12	3630	860	1631	1.75
0.8	----	----	----	----	5005	1042	3090	3.31	4658	1000	2648	2.84	4307	956	2239	2.40	3859	910	1862	2.00	3416	862	1517	1.63
0.9	----	----	----	----	4840	1044	2969	3.18	4493	1002	2527	2.71	4100	958	2118	2.27	3652	912	1741	1.87	3209	864	1396	1.50
1	5029	1087	3317	3.56	4673	1046	2843	3.05	4325	1004	2402	2.58	3898	960	1992	2.14	3450	914	1615	1.73	3007	866	1271	1.36
1.1	4862	1089	3191	3.42	4506	1049	2717	2.91	4159	1006	2275	2.44	3697	962	1866	2.00	3249	916	1489	1.60	2805	869	1144	1.23
1.2	4697	1092	3066	3.29	4341	1051	2592	2.78	3993	1009	2151	2.31	3494	965	1741	1.87	3046	919	1364	1.46	----	----	----	----
1.3	4535	1094	2947	3.16	4179	1054	2473	2.65	3832	1011	2031	2.18	3285	967	1622	1.74	----	----	----	----	----	----	----	----
1.4	4379	1096	2835	3.04	4023	1056	2361	2.53	3676	1013	1919	2.06	----	----	----	----	----	----	----	----	----	----	----	----
1.5	4230	1098	2734	2.93	3874	1057	2260	2.42	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1.6	4090	1099	2646	2.84	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	0 Turns Open				1 Turns Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open			



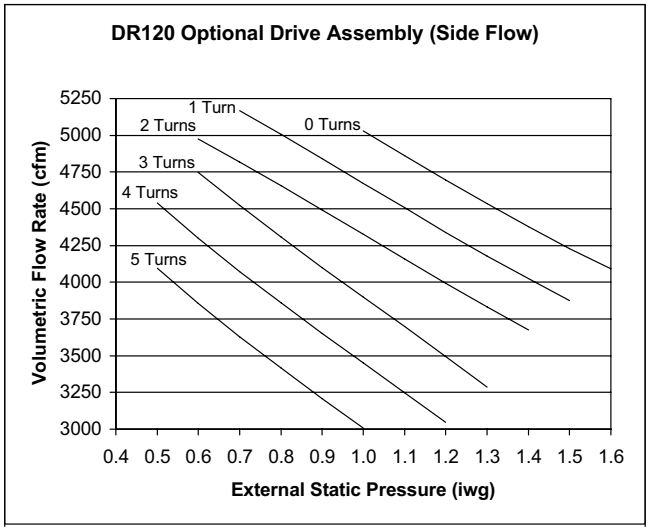
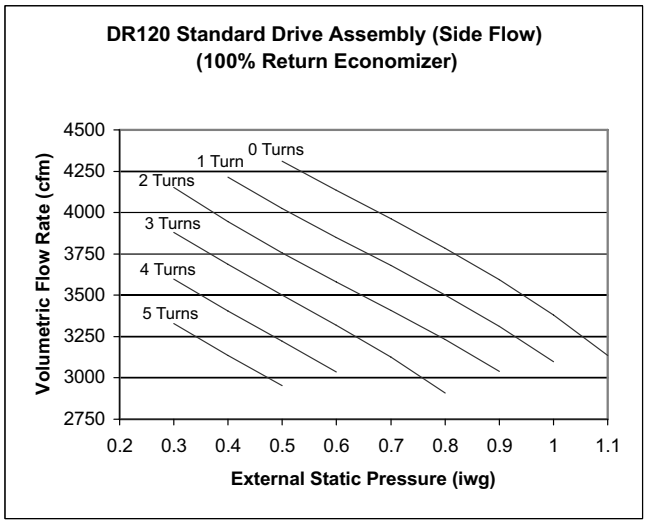


TABLE 24: BLOWER PERFORMANCE DR120 SIDE FLOW ECONOMIZER

DR120 Standard Drive Assembly (Side Flow) (100% Return Economizer)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.3	----	----	----	----	----	----	----	----	4152	858	1764	1.89	3880	820	1530	1.64	3599	783	1341	1.44	3330	746	1137	1.22
0.4	----	----	----	----	4214	899	1948	2.09	3944	859	1693	1.82	3686	821	1460	1.57	3404	784	1271	1.36	3136	747	1067	1.14
0.5	4309	939	2099	2.25	4026	900	1875	2.01	3756	860	1620	1.74	3502	822	1388	1.49	3221	785	1198	1.29	2952	748	995	1.07
0.6	4134	940	2024	2.17	3851	901	1800	1.93	3581	861	1545	1.66	3319	823	1314	1.41	3037	786	1125	1.21	----	----	----	----
0.7	3961	941	1944	2.09	3678	902	1720	1.85	3409	863	1465	1.57	3124	824	1239	1.33	----	----	----	----	----	----	----	----
0.8	3784	942	1859	1.99	3501	904	1636	1.75	3231	864	1381	1.48	2909	825	1163	1.25	----	----	----	----	----	----	----	----
0.9	3594	944	1769	1.90	3311	905	1545	1.66	3041	866	1290	1.38	----	----	----	----	----	----	----	----	----	----	----	----
1.0	3381	946	1670	1.79	3098	907	1447	1.55	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1.1	3137	948	1564	1.68	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	0 Turns Open				1 Turns Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open			

DR120 Optional Drive Assembly (Side Flow) (100% Return Economizer)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	4390	904	2121	2.27	4026	856	1790	1.92
0.5	----	----	----	----	----	----	----	----	4693	996	2736	2.94	4471	952	2320	2.49	4140	905	2012	2.16	3775	858	1681	1.80
0.6	----	----	----	----	4863	1041	3044	3.27	4533	998	2622	2.81	4265	953	2226	2.39	3934	907	1918	2.06	3569	860	1587	1.70
0.7	----	----	----	----	4714	1042	2939	3.15	4383	1000	2517	2.70	4090	955	2142	2.30	3758	909	1834	1.97	3394	861	1503	1.61
0.8	4876	1086	3219	3.45	4572	1044	2840	3.05	4242	1002	2419	2.59	3930	957	2062	2.21	3598	911	1754	1.88	3234	863	1423	1.53
0.9	4741	1088	3126	3.35	4437	1046	2748	2.95	4107	1004	2326	2.50	3770	959	1981	2.13	3439	913	1674	1.80	3075	865	1343	1.44
1.0	4612	1090	3037	3.26	4308	1049	2659	2.85	3978	1006	2237	2.40	3597	961	1895	2.03	3266	915	1587	1.70	2902	868	1256	1.35
1.1	4486	1092	2952	3.17	4182	1051	2574	2.76	3852	1008	2152	2.31	3396	963	1797	1.93	3065	917	1489	1.60	----	----	----	----
1.2	4363	1094	2868	3.08	4059	1053	2490	2.67	3729	1010	2068	2.22	3152	966	1682	1.80	2821	920	1375	1.47	----	----	----	----
1.3	4240	1096	2784	2.99	3936	1055	2406	2.58	3606	1012	1984	2.13	2850	968	1546	1.66	----	----	----	----	----	----	----	----
1.4	4116	1098	2700	2.90	3812	1057	2321	2.49	3482	1015	1900	2.04	----	----	----	----	----	----	----	----	----	----	----	----
1.5	3990	1101	2613	2.80	3686	1060	2234	2.40	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1.6	3859	1103	2522	2.71	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	0 Turns Open				1 Turns Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open			



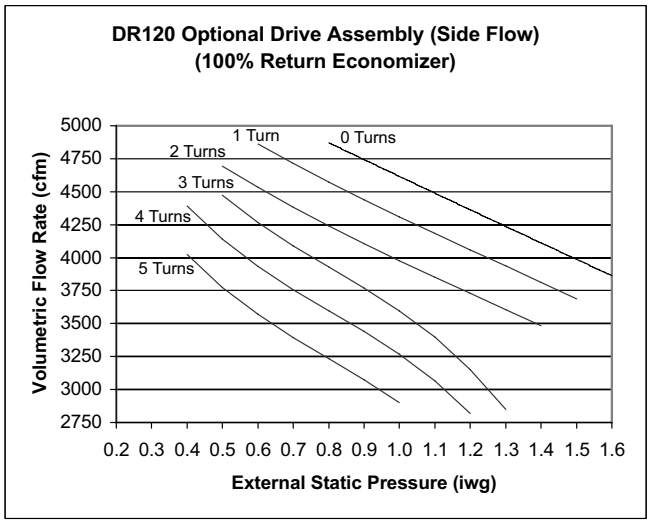
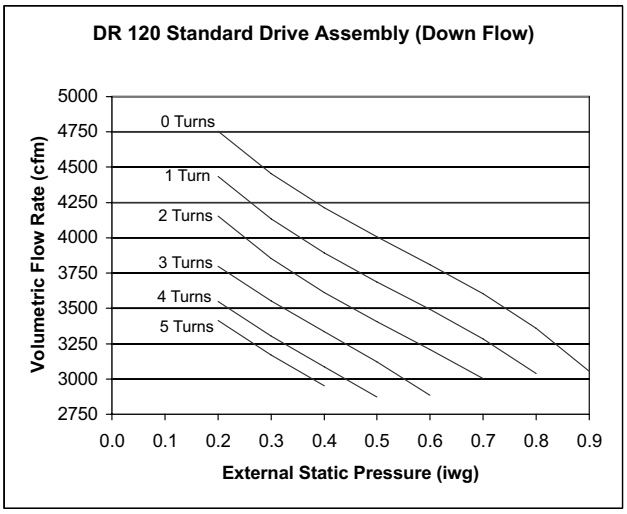


TABLE 25: BLOWER PERFORMANCE DR120 DOWN FLOW

DR120 Standard Drive Assembly (Down Flow)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.2	4755	914	2162	2.32	4436	875	1964	2.11	4154	838	1739	1.87	3799	800	1476	1.58	3549	762	1296	1.39	3415	725	1168	1.25
0.3	4455	915	2034	2.18	4136	877	1836	1.97	3853	839	1611	1.73	3553	802	1372	1.47	3303	764	1192	1.28	3169	727	1064	1.14
0.4	4213	917	1935	2.08	3894	879	1737	1.86	3611	841	1512	1.62	3336	803	1286	1.38	3086	766	1107	1.19	2952	728	979	1.05
0.5	4006	918	1851	1.99	3687	880	1652	1.77	3405	842	1428	1.53	3123	805	1204	1.29	2872	767	1024	1.10	----	----	----	----
0.6	3811	920	1767	1.90	3492	882	1568	1.68	3209	844	1344	1.44	2885	806	1109	1.19	----	----	----	----	----	----	----	----
0.7	3603	922	1669	1.79	3284	884	1471	1.58	3002	846	1246	1.34	----	----	----	----	----	----	----	----	----	----	----	----
0.8	3359	924	1543	1.66	3040	886	1345	1.44	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
0.9	3056	926	1375	1.48	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	0 Turns Open				1 Turn Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open			

DR120 Optional Drive Assembly (Down Flow)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	4156	909	2226	2.39	3811	860	1669	1.79
0.5	----	----	----	----	----	----	----	----	4635	1003	2569	2.76	4287	957	2367	2.54	3942	910	2132	2.29	3597	861	1575	1.69
0.6	----	----	----	----	4773	1048	2865	3.07	4425	1004	2477	2.66	4078	959	2274	2.44	3732	911	2038	2.19	3388	862	1481	1.59
0.7	4919	1091	3182	3.41	4569	1049	2764	2.97	4221	1006	2376	2.55	3874	960	2180	2.34	3528	913	1944	2.09	3183	864	1387	1.49
0.8	4721	1092	3073	3.30	4371	1051	2655	2.85	4023	1007	2267	2.43	3676	962	2085	2.24	3330	915	1850	1.98	----	----	----	----
0.9	4530	1094	2958	3.17	4180	1052	2540	2.72	3832	1009	2152	2.31	3485	964	1990	2.14	----	----	----	----	----	----	----	----
1	4347	1096	2839	3.05	3997	1055	2421	2.60	3649	1011	2033	2.18	----	----	----	----	----	----	----	----	----	----	----	----
1.1	4172	1099	2717	2.91	3822	1057	2299	2.47	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1.2	4007	1101	2595	2.78	3658	1060	2178	2.34	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1.3	3853	1104	2475	2.65	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	0 Turns Open				1 Turn Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open			



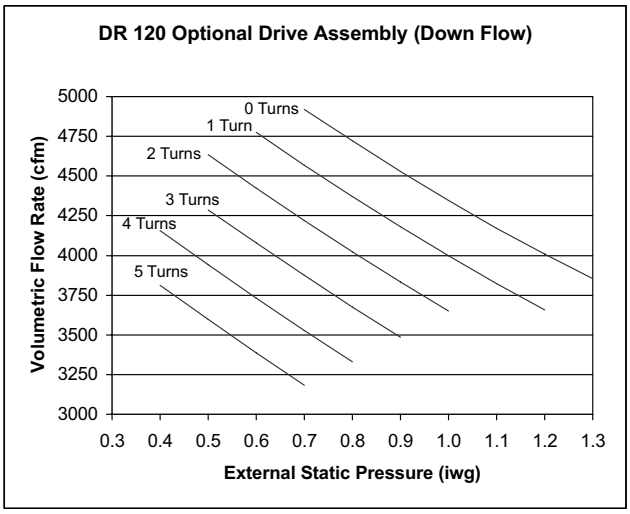
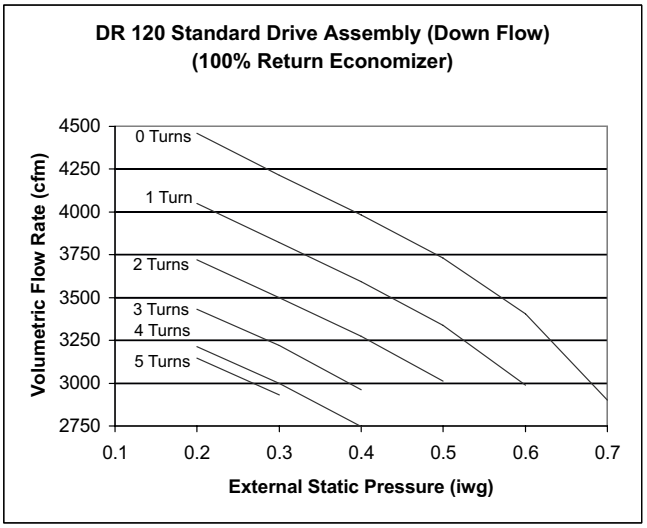


TABLE 26: BLOWER PERFORMANCE DR120 DOWN FLOW ECONOMIZER

DR120 Standard Drive Assembly (Down Flow) (100% Return Economizer)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.2	4461	915	2037	2.19	4050	878	1801	1.93	3721	840	1557	1.67	3433	802	1324	1.42	3214	765	1157	1.24	3148	727	1056	1.13
0.3	4216	917	1936	2.08	3820	879	1707	1.83	3499	842	1466	1.57	3219	804	1241	1.33	2999	766	1073	1.15	2930	728	970	1.04
0.4	3982	919	1840	1.97	3593	881	1613	1.73	3274	844	1372	1.47	2962	806	1140	1.22	2746	768	975	1.05	----	----	----	----
0.5	3730	921	1730	1.86	3337	883	1496	1.61	3013	846	1251	1.34	----	----	----	----	----	----	----	----	----	----	----	----
0.6	3404	924	1567	1.68	2988	886	1317	1.41	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
0.7	2902	928	1288	1.38	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	0 Turns Open				1 Turn Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open			

DR120 Optional Drive Assembly (Down Flow) (100% Return Economizer)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.3	----	----	----	----	----	----	----	----	----	----	----	----	4240	958	2346	2.52	3801	911	2069	2.2	3315	863	1448	1.6
0.4	----	----	----	----	----	----	----	----	4437	1004	2483	2.66	4048	959	2260	2.42	3611	912	1983	2.1	3128	864	1362	1.5
0.5	4893	1091	3168	3.40	4599	1049	2780	2.98	4258	1005	2395	2.57	3870	960	2178	2.34	3435	914	1901	2	----	----	----	----
0.6	4726	1092	3076	3.30	4431	1050	2689	2.88	4089	1007	2305	2.47	3702	962	2098	2.25	3270	915	1821	2	----	----	----	----
0.7	4567	1094	2981	3.20	4270	1052	2596	2.78	3929	1008	2211	2.37	3543	963	2020	2.17	----	----	----	----	----	----	----	----
0.8	4414	1095	2883	3.09	4115	1053	2499	2.68	3774	1010	2115	2.27	3389	965	1941	2.08	----	----	----	----	----	----	----	----
0.9	4264	1097	2782	2.98	3963	1055	2398	2.57	3621	1012	2014	2.16	----	----	----	----	----	----	----	----	----	----	----	----
1	4116	1099	2676	2.87	3813	1057	2293	2.46	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1.1	3968	1102	2566	2.75	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	0 Turns Open				1 Turn Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open			



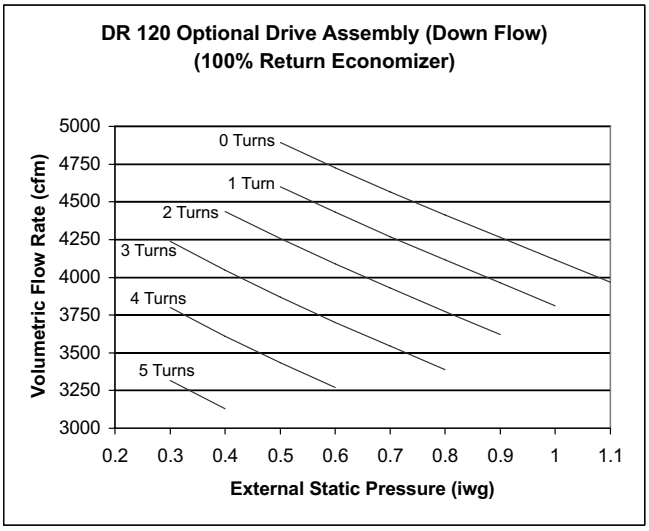
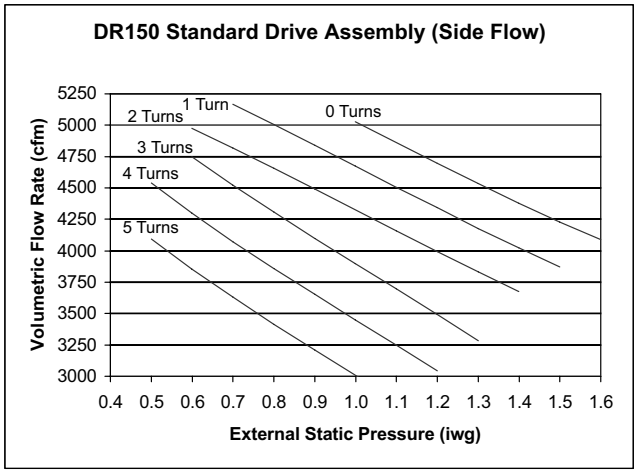


TABLE 27: BLOWER PERFORMANCE DR150 SIDE FLOW

DR150 Standard Drive Assembly (Side Flow)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	4539	907	2170	2.33	4095	859	1825	1.96
0.6	----	----	----	----	----	----	----	----	4976	997	2866	3.07	4747	953	2456	2.64	4299	907	2079	2.23	3856	860	1735	1.86
0.7	----	----	----	----	5167	1041	3204	3.44	4820	998	2762	2.96	4522	954	2353	2.52	4074	908	1976	2.12	3630	860	1631	1.75
0.8	----	----	----	----	5005	1042	3090	3.31	4658	1000	2648	2.84	4307	956	2239	2.40	3859	910	1862	2.00	3416	862	1517	1.63
0.9	----	----	----	----	4840	1044	2969	3.18	4493	1002	2527	2.71	4100	958	2118	2.27	3652	912	1741	1.87	3209	864	1396	1.50
1	5029	1087	3317	3.56	4673	1046	2843	3.05	4325	1004	2402	2.58	3898	960	1992	2.14	3450	914	1615	1.73	3007	866	1271	1.36
1.1	4862	1089	3191	3.42	4506	1049	2717	2.91	4159	1006	2275	2.44	3697	962	1866	2.00	3249	916	1489	1.60	2805	869	1144	1.23
1.2	4697	1092	3066	3.29	4341	1051	2592	2.78	3993	1009	2151	2.31	3494	965	1741	1.87	3046	919	1364	1.46	----	----	----	----
1.3	4535	1094	2947	3.16	4179	1054	2473	2.65	3832	1011	2031	2.18	3285	967	1622	1.74	----	----	----	----	----	----	----	----
1.4	4379	1096	2835	3.04	4023	1056	2361	2.53	3676	1013	1919	2.06	----	----	----	----	----	----	----	----	----	----	----	----
1.5	4230	1098	2734	2.93	3874	1057	2260	2.42	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1.6	4090	1099	2646	2.84	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	0 Turns Open				1 Turn Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open			

DR150 Optional Drive Assembly (Side Flow)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	5211	1066	3048	3.56
0.6	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	5285	1111	3356	3.91	5002	1066	2948	3.44
0.7	----	----	----	----	----	----	----	----	----	----	----	----	5398	1155	3698	4.31	5099	1111	3259	3.80	4816	1067	2852	3.33
0.8	----	----	----	----	5812	1239	4607	5.37	5500	1198	4070	4.75	5232	1156	3604	4.20	4932	1112	3165	3.69	4649	1067	2758	3.22
0.9	5987	1279	5039	5.88	5677	1239	4512	5.26	5366	1198	3974	4.64	5081	1156	3511	4.10	4782	1112	3073	3.59	4499	1067	2666	3.11
1	5865	1280	4944	5.77	5555	1240	4417	5.15	5244	1199	3880	4.53	4945	1157	3420	3.99	4646	1113	2981	3.48	4363	1068	2574	3.00
1.1	5753	1281	4848	5.66	5443	1241	4322	5.04	5131	1200	3784	4.41	4820	1157	3327	3.88	4521	1114	2889	3.37	4238	1069	2481	2.90
1.2	5646	1281	4751	5.54	5336	1242	4225	4.93	5025	1201	3687	4.30	4703	1158	3233	3.77	4403	1115	2795	3.26	4120	1070	2388	2.79
1.3	5542	1282	4651	5.43	5232	1243	4125	4.81	4921	1202	3587	4.18	4590	1159	3137	3.66	4291	1116	2699	3.15	4008	1071	2291	2.67
1.4	5438	1284	4548	5.31	5128	1244	4021	4.69	4816	1203	3483	4.06	4481	1160	3037	3.54	4181	1117	2599	3.03	3898	1072	2192	2.56
1.5	5329	1285	4439	5.18	5019	1245	3912	4.56	4707	1204	3375	3.94	4370	1162	2933	3.42	4071	1118	2495	2.91	3788	1073	2087	2.44
1.6	5212	1286	4325	5.05	4902	1246	3798	4.43	4591	1205	3260	3.80	4256	1163	2824	3.29	3957	1119	2385	2.78	----	----	----	----
1.7	5085	1288	4203	4.90	4775	1248	3677	4.29	4464	1207	3139	3.66	4136	1164	2707	3.16	----	----	----	----	----	----	----	----
1.8	4944	1289	4074	4.75	4633	1249	3548	4.14	4322	1208	3010	3.51	----	----	----	----	----	----	----	----	----	----	----	----
1.9	4784	1291	3937	4.59	4474	1251	3410	3.98	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
2	4604	1293	3789	4.42	4294	1253	3262	3.81	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
2.1	4399	1294	3630	4.24	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	1 Turn Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open				6 Turns Open			



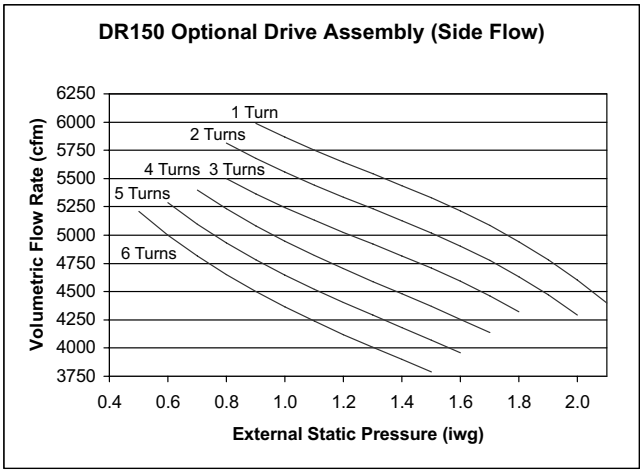
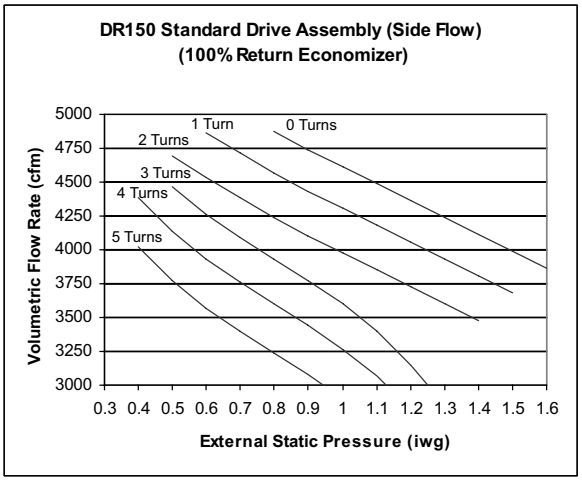


TABLE 28: BLOWER PERFORMANCE DR150 SIDE FLOW ECONOMIZER

DR150 Standard Drive Assembly (Side Flow) (100% Return Economizer)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	4390	904	2121	2.27	4026	856	1790	1.92
0.5	----	----	----	----	----	----	----	----	4693	996	2736	2.94	4471	952	2320	2.49	4140	905	2012	2.16	3775	858	1681	1.80
0.6	----	----	----	----	4863	1041	3044	3.27	4533	998	2622	2.81	4265	953	2226	2.39	3934	907	1918	2.06	3569	860	1587	1.70
0.7	----	----	----	----	4714	1042	2939	3.15	4383	1000	2517	2.70	4090	955	2142	2.30	3758	909	1834	1.97	3394	861	1503	1.61
0.8	4876	1086	3219	3.45	4572	1044	2840	3.05	4242	1002	2419	2.59	3930	957	2062	2.21	3598	911	1754	1.88	3234	863	1423	1.53
0.9	4741	1088	3126	3.35	4437	1046	2748	2.95	4107	1004	2326	2.50	3770	959	1981	2.13	3439	913	1674	1.80	3075	865	1343	1.44
1.0	4612	1090	3037	3.26	4308	1049	2659	2.85	3978	1006	2237	2.40	3597	961	1895	2.03	3266	915	1587	1.70	2902	868	1256	1.35
1.1	4486	1092	2952	3.17	4182	1051	2574	2.76	3852	1008	2152	2.31	3396	963	1797	1.93	3065	917	1489	1.60	----	----	----	----
1.2	4363	1094	2868	3.08	4059	1053	2490	2.67	3729	1010	2068	2.22	3152	966	1682	1.80	2821	920	1375	1.47	----	----	----	----
1.3	4240	1096	2784	2.99	3936	1055	2406	2.58	3606	1012	1984	2.13	2850	968	1546	1.66	----	----	----	----	----	----	----	----
1.4	4116	1098	2700	2.90	3812	1057	2321	2.49	3482	1015	1900	2.04	----	----	----	----	----	----	----	----	----	----	----	----
1.5	3990	1101	2613	2.80	3686	1060	2234	2.40	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1.6	3859	1103	2522	2.71	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	0 Turns Open				1 Turns Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open			

DR150 Optional Drive Assembly (Side Flow) (100% Return Economizer)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	5072	1112	3186	3.72	4790	1067	2831	3.30
0.5	----	----	----	----	----	----	----	----	----	----	----	----	5226	1156	3511	4.10	4933	1112	3110	3.63	4651	1067	2755	3.21
0.6	----	----	----	----	----	----	----	----	5191	1198	3880	4.53	5093	1156	3434	4.01	4800	1112	3033	3.54	4518	1067	2677	3.12
0.7	----	----	----	----	5471	1240	4291	5.01	5151	1199	3801	4.43	4965	1156	3355	3.91	4672	1113	2954	3.45	4390	1068	2598	3.03
0.8	5743	1280	4746	5.54	5412	1240	4211	4.91	5092	1199	3720	4.34	4842	1157	3274	3.82	4549	1113	2873	3.35	4266	1068	2517	2.94
0.9	5666	1281	4664	5.44	5335	1241	4128	4.82	5015	1200	3637	4.24	4722	1158	3191	3.72	4428	1114	2790	3.26	4146	1069	2434	2.84
1.0	5574	1282	4578	5.34	5244	1242	4042	4.72	4923	1201	3552	4.14	4604	1159	3106	3.62	4311	1115	2705	3.16	4029	1070	2349	2.74
1.1	5470	1283	4491	5.24	5139	1243	3955	4.61	4819	1202	3464	4.04	4488	1160	3018	3.52	4195	1116	2617	3.05	3913	1071	2261	2.64
1.2	5355	1284	4400	5.13	5024	1244	3864	4.51	4704	1203	3373	3.94	4372	1161	2927	3.42	4079	1117	2527	2.95	3797	1072	2171	2.53
1.3	5232	1285	4306	5.02	4901	1245	3770	4.40	4581	1204	3279	3.83	4257	1162	2834	3.31	3964	1118	2433	2.84	----	----	----	----
1.4	5103	1286	4209	4.91	4773	1247	3673	4.29	4453	1206	3182	3.71	4140	1163	2737	3.19	3847	1120	2336	2.73	----	----	----	----
1.5	4971	1287	4109	4.79	4641	1248	3573	4.17	4321	1207	3082	3.60	4021	1165	2636	3.08	----	----	----	----	----	----	----	----
1.6	4838	1289	4004	4.67	4508	1249	3468	4.05	4188	1208	2978	3.47	3899	1166	2532	2.95	----	----	----	----	----	----	----	----
1.7	4707	1290	3896	4.55	4376	1250	3360	3.92	4056	1209	2869	3.35	3774	1167	2423	2.83	----	----	----	----	----	----	----	----
1.8	4579	1291	3783	4.41	4248	1252	3247	3.79	3928	1211	2756	3.22	----	----	----	----	----	----	----	----	----	----	----	----
1.9	4456	1292	3666	4.28	4126	1253	3130	3.65	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
2.0	4342	1293	3544	4.13	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	1 Turn Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open				6 Turns Open			



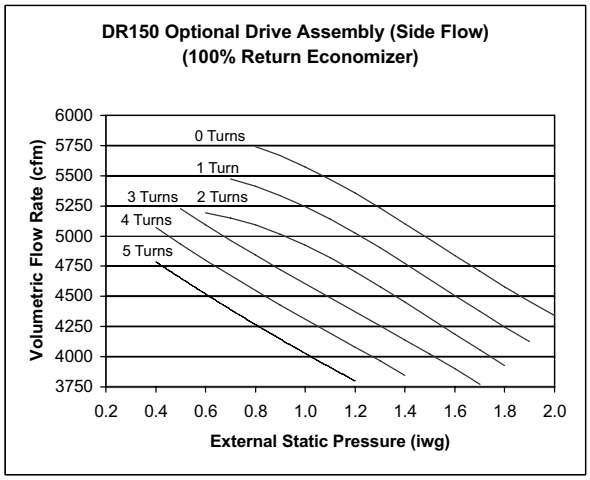
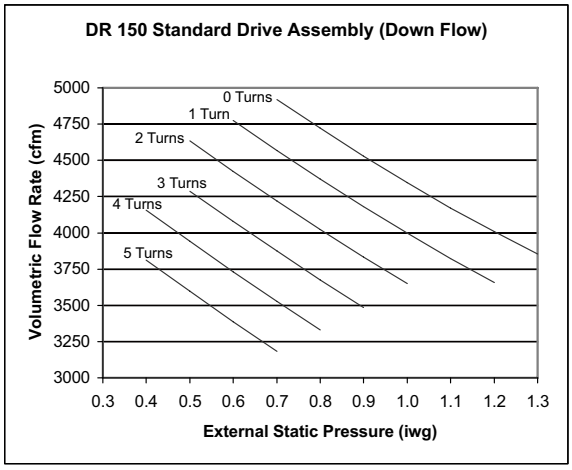


TABLE 29: BLOWER PERFORMANCE DR150 DOWN FLOW

DR150 Standard Drive Assembly (Down Flow)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.4	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	4156	909	2226	2.39	3811	860	1669	1.79
0.5	----	----	----	----	----	----	----	----	4635	1003	2569	2.76	4287	957	2367	2.54	3942	910	2132	2.29	3597	861	1575	1.69
0.6	----	----	----	----	4773	1048	2865	3.07	4425	1004	2477	2.66	4078	959	2274	2.44	3732	911	2038	2.19	3388	862	1481	1.59
0.7	4919	1091	3182	3.41	4569	1049	2764	2.97	4221	1006	2376	2.55	3874	960	2180	2.34	3528	913	1944	2.09	3183	864	1387	1.49
0.8	4721	1092	3073	3.30	4371	1051	2655	2.85	4023	1007	2267	2.43	3676	962	2085	2.24	3330	915	1850	1.98	----	----	----	----
0.9	4530	1094	2958	3.17	4180	1052	2540	2.72	3832	1009	2152	2.31	3485	964	1990	2.14	----	----	----	----	----	----	----	----
1	4347	1096	2839	3.05	3997	1055	2421	2.60	3649	1011	2033	2.18	----	----	----	----	----	----	----	----	----	----	----	----
1.1	4172	1099	2717	2.91	3822	1057	2299	2.47	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1.2	4007	1101	2595	2.78	3658	1060	2178	2.34	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1.3	3853	1104	2475	2.65	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	0 Turns Open				1 Turn Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open			

DR150 Optional Drive Assembly (Down Flow)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	4850	1115	2991	3.49	4589	1070	2656	3.10
0.6	----	----	----	----	5406	1246	4041	4.71	5158	1203	3639	4.24	4906	1160	3259	3.80	4649	1116	2902	3.39	4387	1071	2567	3.00
0.7	5469	1287	4369	5.10	5226	1246	3944	4.60	4978	1204	3542	4.13	4726	1161	3162	3.69	4469	1117	2805	3.27	4207	1072	2471	2.88
0.8	5306	1288	4266	4.98	5063	1247	3841	4.48	4815	1205	3439	4.01	4562	1162	3059	3.57	4305	1117	2702	3.15	4044	1072	2368	2.76
0.9	5156	1288	4158	4.85	4912	1247	3733	4.36	4665	1205	3331	3.89	4412	1162	2952	3.44	4155	1118	2594	3.03	3894	1073	2260	2.64
1	5014	1289	4047	4.72	4771	1248	3622	4.23	4523	1206	3220	3.76	4271	1163	2840	3.31	4014	1119	2483	2.90	3752	1073	2149	2.51
1.1	4877	1290	3934	4.59	4634	1249	3509	4.09	4387	1207	3107	3.63	4134	1164	2728	3.18	3877	1119	2370	2.77	----	----	----	----
1.2	4741	1291	3821	4.46	4498	1250	3396	3.96	4250	1208	2994	3.49	3998	1165	2614	3.05	3741	1120	2257	2.63	----	----	----	----
1.3	4601	1292	3709	4.33	4358	1251	3284	3.83	4110	1209	2882	3.36	3858	1166	2502	2.92	----	----	----	----	----	----	----	----
1.4	4454	1295	3600	4.20	4211	1254	3175	3.70	3963	1211	2773	3.24	3710	1168	2393	2.79	----	----	----	----	----	----	----	----
1.5	4294	1297	3495	4.08	4051	1256	3070	3.58	3803	1214	2668	3.11	----	----	----	----	----	----	----	----	----	----	----	----
	1 Turn Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open				6 Turns Open			



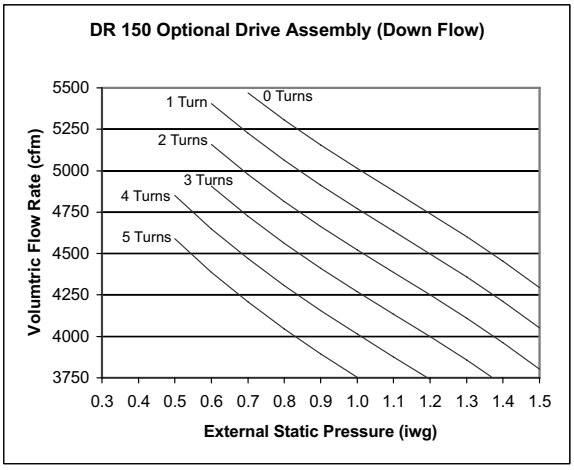
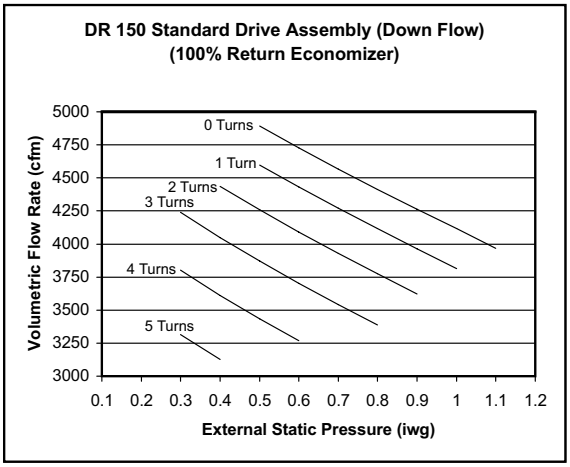


TABLE 30: BLOWER PERFORMANCE DR150 DOWN FLOW ECONOMIZER

DR150 Standard Drive Assembly (Down Flow) (100% Return Economizer)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.3	----	----	----	----	----	----	----	----	----	----	----	----	4240	958	2346	2.52	3801	911	2069	2.22	3315	863	1448	1.55
0.4	----	----	----	----	----	----	----	----	4437	1004	2483	2.66	4048	959	2260	2.42	3611	912	1983	2.13	3128	864	1362	1.46
0.5	4893	1091	3168	3.40	4599	1049	2780	2.98	4258	1005	2395	2.57	3870	960	2178	2.34	3435	914	1901	2.04	----	----	----	----
0.6	4726	1092	3076	3.30	4431	1050	2689	2.88	4089	1007	2305	2.47	3702	962	2098	2.25	3270	915	1821	1.95	----	----	----	----
0.7	4567	1094	2981	3.20	4270	1052	2596	2.78	3929	1008	2211	2.37	3543	963	2020	2.17	----	----	----	----	----	----	----	----
0.8	4414	1095	2883	3.09	4115	1053	2499	2.68	3774	1010	2115	2.27	3389	965	1941	2.08	----	----	----	----	----	----	----	----
0.9	4264	1097	2782	2.98	3963	1055	2398	2.57	3621	1012	2014	2.16	----	----	----	----	----	----	----	----	----	----	----	----
1	4116	1099	2676	2.87	3813	1057	2293	2.46	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
1.1	3968	1102	2566	2.75	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
	0 Turns Open				1 Turn Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open			

DR150 Optional Drive Assembly (Down Flow) (100% Return Economizer)																								
ESP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP	CFM	RPM	WATT	BHP
0.4	5344	1288	4291	5.01	5247	1246	3957	4.62	5128	1204	3624	4.23	4982	1160	3295	3.84	4803	1115	2972	3.47	4589	1070	2656	3.1
0.5	5121	1289	4132	4.82	5007	1247	3803	4.44	4871	1205	3476	4.06	4710	1161	3153	3.68	4520	1117	2834	3.31	4297	1071	2521	2.94
0.6	4944	1289	3989	4.65	4823	1248	3664	4.27	4677	1205	3341	3.90	4507	1162	3021	3.52	4309	1117	2705	3.16	4083	1072	2393	2.79
0.7	4797	1290	3866	4.51	4673	1249	3542	4.13	4523	1206	3220	3.76	4348	1162	2902	3.39	4146	1118	2588	3.02	3917	1073	2277	2.66
0.8	4667	1292	3761	4.39	4545	1249	3435	4.01	4395	1207	3114	3.63	4218	1163	2797	3.26	4014	1119	2483	2.9	3783	1073	2173	2.54
0.9	4549	1293	3669	4.28	4432	1251	3342	3.90	4283	1207	3021	3.52	4105	1164	2704	3.15	3901	1119	2390	2.79	----	----	----	----
1	4438	1295	3588	4.19	4326	1252	3260	3.80	4180	1208	2937	3.43	4004	1165	2619	3.06	3800	1120	2306	2.69	----	----	----	----
1.1	4327	1297	3515	4.10	4223	1253	3183	3.71	4081	1210	2859	3.34	3907	1166	2541	2.96	3704	1121	2227	2.6	----	----	----	----
1.2	4211	1299	3446	4.02	4115	1255	3111	3.63	3979	1211	2785	3.25	3809	1167	2465	2.88	----	----	----	----	----	----	----	----
1.3	4082	1302	3377	3.94	3998	1257	3038	3.54	3869	1213	2710	3.16	3703	1168	2388	2.79	----	----	----	----	----	----	----	----
1.4	3932	1306	3308	3.86	3862	1260	2964	3.46	3742	1216	2632	3.07	----	----	----	----	----	----	----	----	----	----	----	----
	1 Turn Open				2 Turns Open				3 Turns Open				4 Turns Open				5 Turns Open				6 Turns Open			



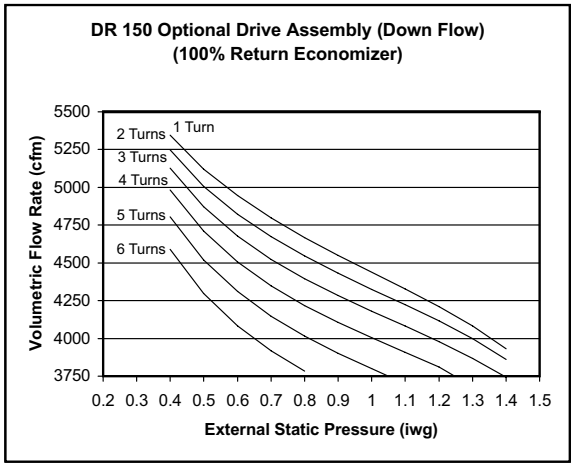


TABLE 31: INDOOR BLOWER SPECIFICATIONS

MODEL	MOTOR					MOTOR SHEAVE			BLOWER SHEAVE			BELT
	HP	RPM	Eff.	SF	Frame	Datum Dia. (in.)	Bore (in.)	Model	Datum Dia. (in.)	Bore (in.)	Model	
DR090	1-1/2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	9.0	1	AK94	A57
	2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	7.5	1	AK79	A55
DR120	2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	8.5	1	AK89	A56
	3	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	7.0	1	AK74	A54
DR150	3	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	7.0	1	AK74	A54
	5	1725	87%	1.15	184T	4.3 - 5.3	1 1/8	1VP56	6.7	1	BK77	BX55

TABLE 32: POWER EXHAUST SPECIFICATIONS

POWER EXHAUST MODEL	VOLT	PHASE	MOTOR			ELECTRICAL			FUSE SIZE	CFM @ 0.1 ESP
			HP	RPM*	QTY	LRA	FLA	MCA		
2PE0473125	208/230	1	0.75	1075	1	24.9	5.0	6.3	10	3,800
2PE0473146	460	1				N/A	2.2	2.8	5	
2PE0473158	575	1		1050			1.5	1.9	4	

*. Motors are multi-tapped and factory-wired for high speed.

AIR BALANCE

Start the supply air blower motor. Adjust the resistances in both the supply and the return air duct systems to balance the air distribution throughout the conditioned space. The job specifications may require that this balancing be done by someone other than the equipment installer.

CHECKING AIR QUANTITY

METHOD ONE

1. Remove the dot plugs from the duct panel (for location of the dot plugs see Figures 15 and 16).
2. Insert eight-inches of 1/4 inch metal tubing into the air-flow on both sides of the indoor coil.

NOTE: The tubes must be inserted and held in a position perpendicular to the air flow so that velocity pressure will not affect the static pressure readings.

3. Use an Inclined Manometer or Magnehelic to determine the pressure drop across a dry evaporator coil. Since the moisture on an evaporator coil can vary greatly, measuring the pressure drop across a wet coil under field conditions could be inaccurate. To assure a dry coil, the compressors should be de-activated while the test is being run.

NOTE: De-energize the compressors before taking any test measurements to assure a dry evaporator coil.

4. The CFM through the unit can be determined from the pressure drop indicated by the manometer by referring to Figure 31. In order to obtain an accurate measurement, be certain that the air filters are clean.
5. To adjust Measured CFM to Required CFM, see 'SUPPLY AIR DRIVE ADJUSTMENT'.
6. After readings have been obtained, remove the tubes and replace the dot plugs.

⚠WARNING

Failure to properly adjust the total system air quantity can result in extensive blower damage.

METHOD TWO

1. Drill two 5/16 inch holes, one in the return air duct as close to the inlet of the unit as possible, and another in the supply air duct as close to the outlet of the unit as possible.
2. Using the whole drilled in step 1, insert eight inches of 1/4 inch metal tubing into the airflow of the return and supply air ducts of the unit.

NOTE: The tubes must be inserted and held in position perpendicular to the airflow so that velocity pressure will not affect the static pressure readings.

3. Use an Inclined Manometer or Magnehelic to determine the pressure drop across the unit. This is the External Static Pressure (ESP). In order to obtain an accurate measurement, be certain that the air filters are clean.
4. Determine the number of turns the variable motor sheave is open.
5. Select the correct blower performance table for the unit from Tables 19 - 30. Tables are presented for horizontal and downflow configuration.
6. Determine the unit Measured CFM from the Blower Performance Table, External Static Pressure and the number of turns the variable motor sheave is open.
7. To adjust Measured CFM to Required CFM, see 'SUPPLY AIR DRIVE ADJUSTMENT'.
8. After reading has been obtained, remove the tubes and seal holes.

NOTE: With the addition of field installed accessories repeat this procedure.

⚠WARNING

Failure to properly adjust the total system air quantity can result in extensive blower damage.

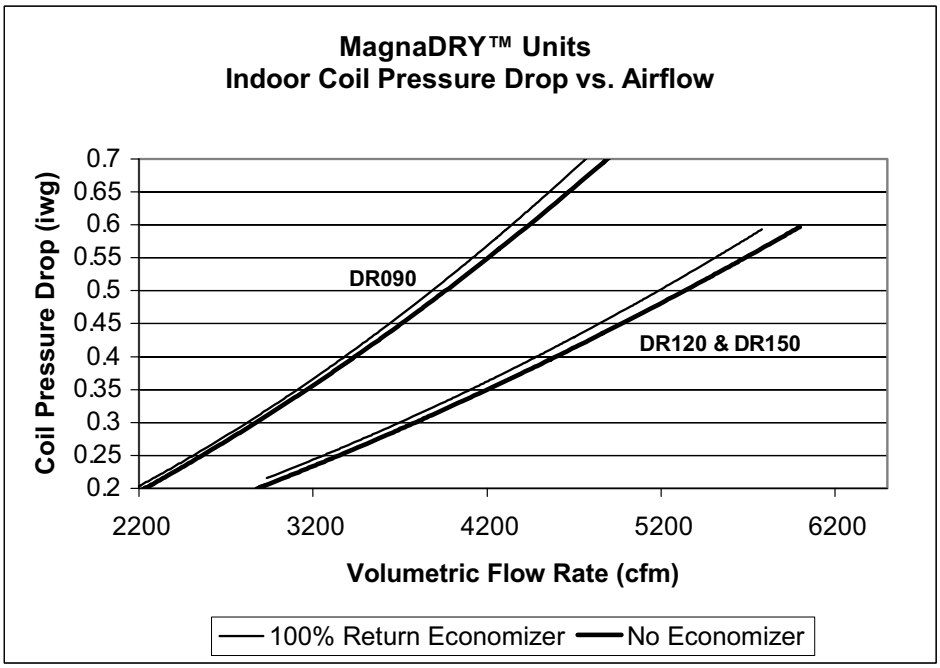


FIGURE 31 - DRY COIL DELTA P

SUPPLY AIR DRIVE ADJUSTMENT

⚠ CAUTION

Before making any blower speed changes review the installation for any installation errors, leaks or undesirable systems effects that can result in loss of airflow.

Even small changes in blower speed can result in substantial changes in static pressure and BHP. BHP and AMP draw of the blower motor will increase by the cube of the blower speed. Static pressure will increase by the square of the blower speed. Only qualified personnel should make blower speed changes, strictly adhering to the fan laws.

At unit start-up, the measured CFM may be higher or lower than the required CFM. To achieve the required CFM, the speed of the drive may have adjusted by changing the datum diameter (DD) of the variable pitch motor sheave as described below:

$$\left(\frac{\text{Required CFM}}{\text{Measured CFM}}\right) \bullet \text{Existing DD} = \text{New DD}$$

Use the following tables and the DD calculated per the above equation to adjust the motor variable pitch sheave.

EXAMPLE

A 12.5 ton unit was selected to deliver 4,000 CFM with a 3 HP motor, but the unit is delivering 3,800 CFM. The variable pitch motor sheave is set at 2 turns open.

Use the equation to determine the required DD for the new motor sheave,

$$\left(\frac{\text{4,000 CFM}}{\text{3,800 CFM}}\right) \bullet \text{4.0 in.} = \text{4.21 in.}$$

Use Table 34 to locate the DD nearest to 4.21 in. Close the sheave to 1 turn open.

New BHP

= (Speed increase)^3 • BHP at 3,800 CFM

= (Speed increase)^3 • Original BHP

= New BHP

New motor Amps

= (Speed increase)^3 • Amps at 3,800 CFM

= (Speed increase)^3 • Original Amps

= New Amps

TABLE 33: ADDITIONAL STATIC RESISTANCE

CFM	Gas Heat	Electric Heat KW				
		9	18	24	36	54
2300	0.08	0.07	0.08	0.09	0.10	0.13
2500	0.09	0.08	0.09	0.10	0.11	0.14
2700	0.11	0.09	0.10	0.12	0.13	0.16
2900	0.12	0.10	0.11	0.13	0.14	0.18
3100	0.14	0.12	0.13	0.15	0.16	0.20
3300	0.16	0.13	0.14	0.17	0.18	0.22
3500	0.18	0.15	0.16	0.19	0.20	0.24
3700	0.20	0.17	0.18	0.21	0.22	0.26
3900	0.23	0.19	0.20	0.23	0.24	0.28
4100	0.25	0.21	0.22	0.25	0.26	0.31
4300	0.28	0.23	0.24	0.28	0.29	0.34
4500	0.30	0.25	0.26	0.30	0.31	0.37
4700	0.33	0.28	0.29	0.33	0.34	0.40
4900	0.36	0.30	0.31	0.35	0.37	0.43
5100	0.39	0.33	0.34	0.38	0.40	0.46
5300	0.42	0.35	0.37	0.41	0.43	0.49
5500	0.45	0.38	0.40	0.44	0.46	0.53
5700	0.48	0.41	0.43	0.47	0.49	0.56
5900	0.52	0.44	0.46	0.50	0.53	0.59
6100	0.56	0.47	0.49	0.53	0.56	0.62
6300	0.60	0.50	0.53	0.56	0.59	0.65

TABLE 34: MOTOR SHEAVE DATUM DIAMETERS

1VM50x7/8 (1-1/2, 2 & 3 HP Motor)		1VP56x1-1/8 (5 HP Motor)	
Turns Open	Datum Diameter	Turns Open	Datum Diameter
0	4.4	**1**	5.3
1/2	4.3	**1-1/2**	5.2
1	4.2	**2**	5.1
1-1/2	4.1	**2-1/2**	5.0
2	4.0	**3**	4.9
2-1/2	3.9	**3-1/2**	4.8
3	3.8	**4**	4.7
3-1/2	3.7	**4-1/2**	4.6
4	3.6	**5**	4.5
4-1/2	3.5	**5-1/2**	4.4
5	3.4	**6**	4.3

OPERATION

SEQUENCE OF OPERATIONS OVERVIEW

For the Predator MagnaDRY™ series of units, the thermostat makes a circuit between "R" and "Y1" for the first stage of cooling.

The call is passed to the **Unit Control Board (UCB)**, which then determines whether the requested operation is available and, if so, which components to energize.

For gas heating, the UCB monitors the "W1" call but does not handle the operation of the gas furnace. An ignition control board controls the gas heater operation. For electric heat units, the UCB passes the call to the electric heater. In both cases, when the "W1" call is sensed, the indoor air blower is energized following a specified heating delay.

If at any time a call for both heating and cooling are present, the heating operation will be performed. If operating, the cooling system is halted as with a completion of a call for cooling. Heating always takes priority.

COOLING SEQUENCE OF OPERATION

CONTINUOUS BLOWER

By setting the room thermostat fan switch to "ON," the supply air blower will operate continuously.

INTERMITTENT BLOWER

With the room thermostat fan switch set to "AUTO" and the system switch set to either the "AUTO" or "HEAT" settings, the blower is energized whenever a cooling or heating operation is requested. The blower is energized after any specified delay associated with the operation.

When energized, the indoor blower has a minimum run time of 30 seconds. Additionally, the indoor blower has a delay of 10 seconds between operations.

NO OUTDOOR AIR OPTIONS

When the thermostat calls for the first stage of cooling, the low-voltage control circuit from “R” to “Y1” and “G” is completed. The UCB energizes the economizer (if installed and free cooling is available) or the first available compressor* and the condenser fans. For first stage cooling, compressor #1 is energized. If compressor #1 is unavailable, compressor #2 is energized. After completing the specified fan on delay for cooling, the UCB will energize the blower motor.

When the thermostat calls for the second stage of cooling, the low-voltage control circuit from “R” to “Y2” is completed. The control board energizes the first available compressor. If free cooling is being used for the first stage of cooling, compressor #1 is energized. If compressor #1 is active for first stage cooling or the first compressor is locked-out, compressor #2 is energized. In free-cooling mode, if the call for the second stage of cooling continues for 20 minutes, compressor #2 is energized, provided it has not been locked-out.

If there is an initial call for both stages of cooling, the UCB will delay energizing compressor #2 by 30 seconds in order to avoid a power rush.

Once the thermostat has been satisfied, it will de-energize Y1 and Y2. If the compressors have satisfied their minimum run times, the compressors and condenser fans are de-energized. Otherwise, the unit operates each cooling system until the minimum run times for the compressors have been completed. Upon the final compressor de-energizing, the blower is stopped following the elapse of the fan off delay for cooling.

* To be available, a compressor must not be locked-out due to a high or low-pressure switch or freezestat trip and the **Anti-Short Cycle Delay (ASCD)** must have elapsed.

ECONOMIZER WITH SINGLE ENTHALPY SENSOR -

When the room thermostat calls for "first-stage" cooling, the low voltage control circuit from "R" to "G" and "Y1" is completed. The UCB energizes the blower motor (if the fan switch on the room thermostat is set in the "AUTO" position) and drives the economizer dampers from fully closed to their minimum position. If the enthalpy of the outdoor air is below the set point of the enthalpy controller (previously determined), "Y1" energizes the economizer. The dampers will modulate to maintain a constant supply air temperature as monitored by the discharge air sensor. If the outdoor air enthalpy is above the set point, "Y1" energizes compressor #1.

When the thermostat calls for "second-stage" cooling, the low voltage control circuit from "R" to "Y2" is completed. The UCB energizes the first available compressor. If the enthalpy of the outdoor air is below the set point of the enthalpy controller (i.e. first stage has energized the economizer), "Y2" will energize compressor #1. If the outdoor air is above the set point, "Y2" will energize compressor #2.

Once the thermostat has been satisfied, it will de-energize “Y1” and “Y2”. If the compressors have satisfied their minimum run times, the compressors and condenser fans are de-energized. Otherwise, the unit operates each cooling system until the minimum run times for the compressors have been completed. Upon the final compressor de-energizing, the blower is stopped following the elapse of the fan off delay for cooling, and the economizer damper goes to the closed position. If the unit is in continues fan operation, the economizer damper goes to the minimum position.

ECONOMIZER WITH DUAL ENTHALPY SENSORS -

The operation with the dual enthalpy sensors is identical to the single sensor except that a second enthalpy sensor is mounted in the return air. This return air sensor allows the economizer to choose between outdoor air and return air, whichever has the lowest enthalpy value, to provide maximum operating efficiency.

ECONOMIZER WITH POWER EXHAUST -

A unit equipped with an economizer (single or dual enthalpy) and a power exhaust operates as specified above with one addition. The power exhaust motor is energized 45 seconds after the actuator position exceeds the exhaust fan set point on the economizer control. When the power exhaust is operating, the second stage of mechanical cooling will not operate. As always, the "R" to "G" connection provides minimum position but does not provide power exhaust operation.

MOTORIZED OUTDOOR AIR DAMPERS -

This system operation is the same as the units with no outdoor air options with one exception. When the "R" to "G" circuit is complete, the motorized damper drives open to a position set by the thumbwheel on the damper motor. When

the "R" to "G" circuit is opened, the damper spring returns fully closed.

COOLING OPERATION ERRORS

Each cooling system is monitored for operation outside of the intended parameters. Errors are handled as described below. All system errors override minimum run times for compressors.

HIGH-PRESSURE LIMIT SWITCH

During cooling operation, if a high-pressure limit switch opens, the UCB will de-energize the associated compressor, initiate the ASCD (Anti-short cycle delay), and, if the other compressor is idle, stop the condenser fans. If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the halted compressor.

Should a high-pressure switch open three times within two hours of operation, the UCB will lock-out the associated compressor and flash a code (see Table 41). If the other compressor is inactive, the condenser fans will be de-energized.

LOW-PRESSURE LIMIT SWITCH

The low-pressure limit switch is not monitored during the initial 30 seconds of a cooling system's operation. For the following 30 seconds, the UCB will monitor the low-pressure switch to ensure it closes. If the low-pressure switch fails to close after the 30-second monitoring phase, the UCB will de-energize the associated compressor, initiate the ASCD, and, if the other compressor is idle, stop the condenser fans.

Once the low-pressure switch has been proven (closed during the 30-second monitor period described above), the UCB will monitor the low-pressure limit switch for any openings. If the low-pressure switch opens for greater than 5 seconds, the UCB will de-energize the associated compressor, initiate the ASCD, and, if the other compressor is idle, stop the condenser fans.

If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the halted compressor.

Should a low-pressure switch open three times within one hour of operation, the UCB will lock-out the associated compressor and flash a code (Table 41). If the other compressor is inactive, the condenser fans will be de-energized.

FREEZESTAT

During cooling operation, if a freezestat opens, the UCB will de-energize the associated compressor, initiate the ASCD, and, if the other compressor is idle, stop the condenser fans. If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the halted compressor.

Should a freezestat open three times within two hours of operation, the UCB will lock-out the associated compressor and flash a code (Table 41). If the other compressor is inactive, the condenser fans will be de-energized.

LOW AMBIENT COOLING

To determine when to operate in low ambient mode, the UCB has a pair of terminals connected to a temperature-activated switch set at 45ºF. When the low ambient switch is closed and the thermostat is calling for cooling, the UCB will operate in the low ambient mode.

Low ambient mode operates the compressors in this manner: 10 minutes on, 5 minutes off. The indoor blower is operated throughout the cycle. The 5-minute off period is necessary to defrost the indoor coil.

Low ambient mode always begins with compressor operation. Compressor minimum run time may extend the minutes of compressor operation. The defrost cycle will begin immediately following the elapse of the minimum run time.

When operating in low ambient mode, the UCB will not lock-out the compressors due to a freezestat trip. However, a freezestat trip will de-energize the associated compressor. If the call for cooling is still present at the end of the ASCD and the freezestat has closed, the unit will resume operation.

SAFETY CONTROLS

The unit control board monitors the following inputs for each cooling system:

1. A suction line freezestat to protect against low evaporator temperatures due to a low airflow or a low return air temperature, (opens at 26 ± 5 °F and resets at 38 ± 5°F).
2. A high-pressure switch to protect against excessive discharge pressures due to a blocked condenser coil or a condenser motor failure, (opens at 405 ± 10 psig or 440 ± 10 psig depending on unit model).
3. A low-pressure switch to protect against loss of refrigerant charge, (opens at 7 ± 3 psig or 22 ± 5 psig).

The above pressure switches are hard-soldered to the unit. The refrigeration systems are independently monitored and controlled. On any fault, only the associated system will be affected by any safety/preventive action. The other refrigerant system will continue in operation unless it is affected by the fault as well.

The unit control board monitors the temperature limit switch of electric heat units and the temperature limit switch and the gas valve of gas furnace units.

COMPRESSOR PROTECTION

In addition to the external pressure snitches, the compressors also have inherent (internal) protection. If there is an abnormal temperature rise in a compressor, the protector will open to shut down the compressor. The UCB incorporates features to minimize compressor wear and damage. An **Anti-Short Cycle Delay (ASCD)** is utilized to prevent operation of a compressor too soon after its previous run. Additionally, a minimum run time is imposed any time a compressor is energized.

The ASCD is initiated on unit start-up and on any compressor reset or lock-out.

FLASH CODES

The UCB will initiate a flash code associated with errors within the system. Refer to UNIT CONTROL BOARD FLASH CODES Table 41.

RESET

Remove the call for cooling, by raising thermostat setting higher than the conditioned space temperature. This resets any pressure or freezestat flash codes.

REHEAT MODE SEQUENCE OF OPERATION

The reheat control board allows the user to select two different modes of operation via a jumper connection on the board. (See Figure 3.) Each mode is described below. Refer to Figures 3 - 5 when reading this section.

“NORMAL” MODE

When the reheat control board (RCB) detects a need for dehumidification (24VAC) at "HUM" via the field supplied dehumidistat connected to RHTB-1 and RHTB-2 and there is not a call for cooling, it energizes the hot gas relay (HGR), which energizes the 3-way valve (SOL 3), the condenser coil valve (SOL 2), and de-energizes the reheat coil bleed valve (SOL 1). (In the DR150, SOL 2 is only energized when the discharge pressure in circuit #1 rises above 235 psig and de-energizes SOL 2 after the discharge pressure falls below 175 psig. Both outdoor fans of circuit #1 in the DR150 also disengage to conserve energy.) The Y1 signal is passed to the unit control board (UCB), which engages circuit # 1, resulting in circuit #1 reheat mode operation.

When the room thermostat calls for first stage cooling, with or without a call for dehumidification, the RCB senses a signal through "Y1", de-energizing the HGR, which de-energizes SOL 3 and SOL 2 and energizes SOL 1, engaging circuit #1, resulting in circuit #1 cooling mode operation.

When the room thermostat calls for second stage cooling, the RCB senses a signal through "Y1" & "Y2" and engages circuit #1 and circuit #2 in cooling mode.

Indoor blower operation is initiated upon a call for first stage cooling, second stage cooling or dehumidification.

Anytime there is a call for 2 stages of cooling, the unit will not operate in the reheat mode, even if there is a call for dehumidification at "HUM".

The unit will not operate in the reheat mode if there is any call for heating.

On units with economizers, the unit will not operate in the reheat mode if there is a call for cooling and the economizer is operating as first stage of cooling.

All safety devices function as previously described.

"ALTERNATE” MODE

When the RCB detects a need for dehumidification (24VAC) at "HUM" via the field supplied dehumidistat connected to RHTB-1 and RHTB-2, and there is not a call for cooling, it energizes the HGR, which energizes the SOL 3, SOL 2, and de-energizes SOL 1. (In the DR150, SOL 2 is only energized when the discharge pressure in circuit #1 rises above 235 psig and de-energizes SOL 2 after the discharge pressure falls below 175 psig. Both outdoor fans of circuit #1 in the DR150 also disengage to conserve energy.) The unit then operates with circuit #1 in reheat mode and circuit #2 in cooling mode.

When the room thermostat calls for first stage cooling while there is still a call for dehumidification, no operational change is made. The call for cooling is ignored and the unit continues to operate with circuit #1 in reheat mode and circuit #2 in cooling mode.

When the room thermostat calls for second stage cooling, the RCB senses a signal through "Y1" and "Y2" and de-energizes the HGR, which de-energizes SOL 3 and SOL 2, and energizes SOL 1. Both circuits operate in the cooling mode.

Indoor blower operation is initiated upon a call for first stage cooling, second stage cooling or dehumidification.

Anytime there is a call for 2 stages of cooling, the unit will not operate in the reheat mode, even if there is still a call for dehumidification at "HUM".

The unit will not operate in the reheat mode if there is any call for heating.

All safety devices function as previously described.

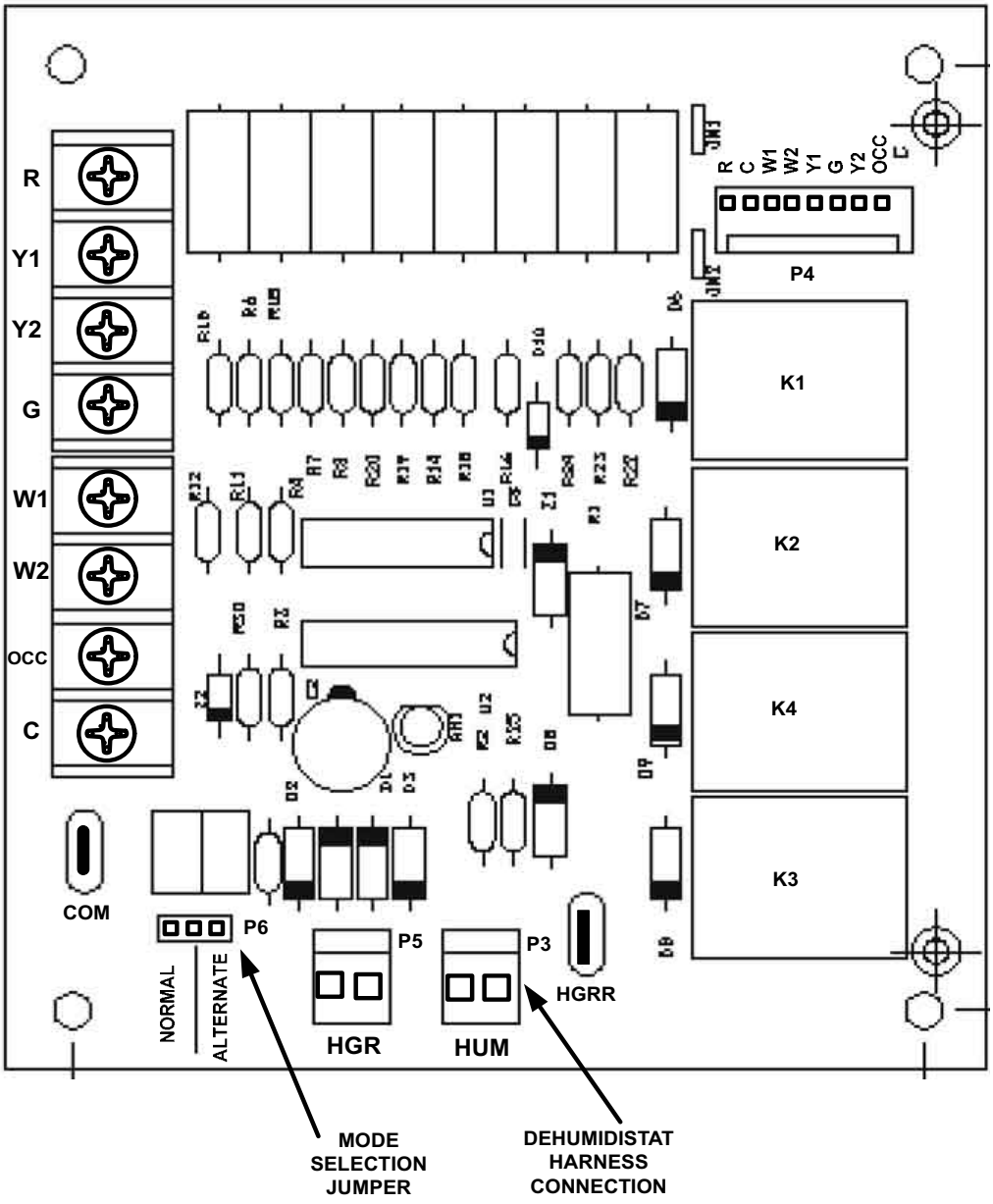


FIGURE 32 - REHEAT CONTROL BOARD

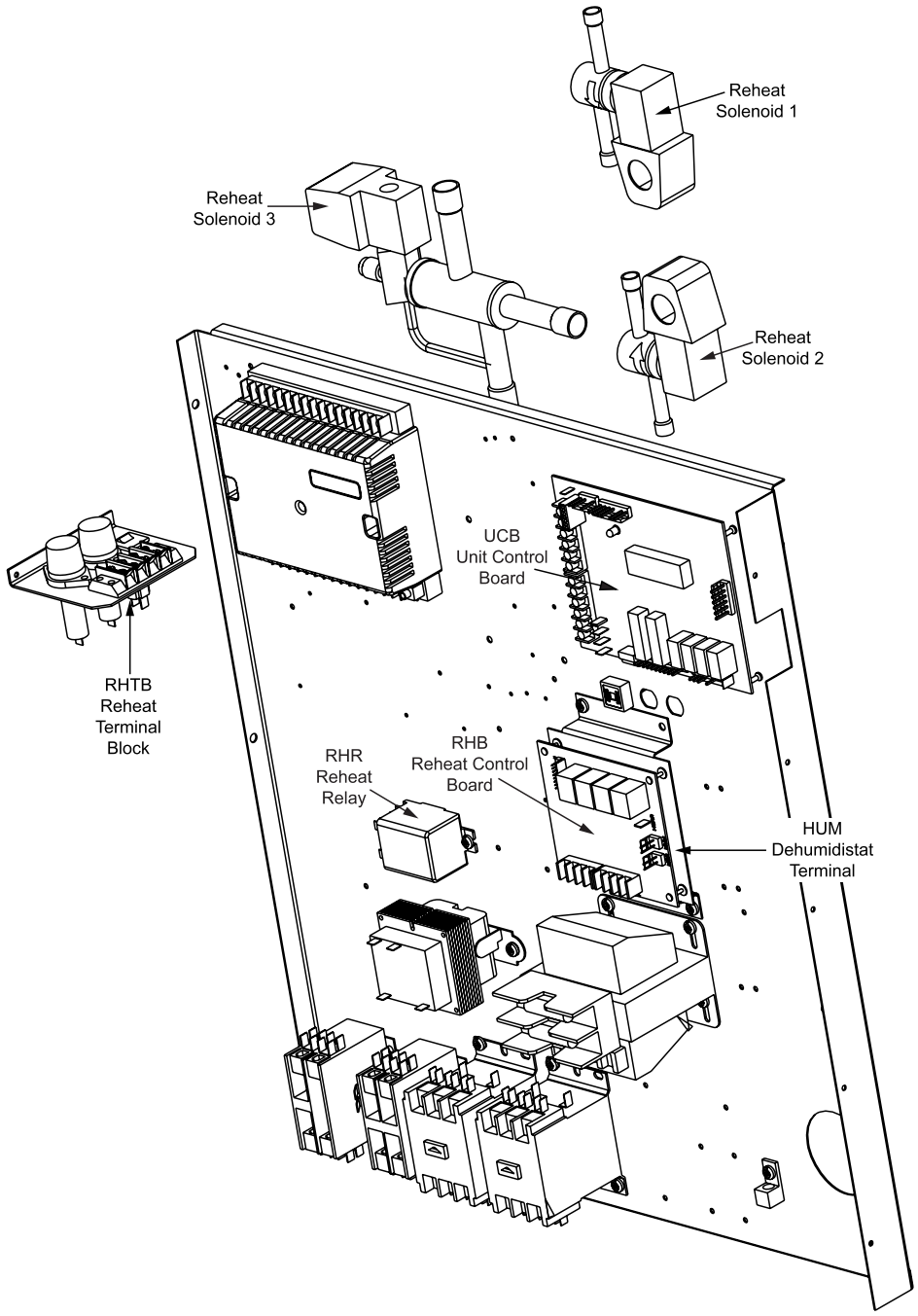


FIGURE 33 - DR090 AND DR120 REHEAT CONTROLS

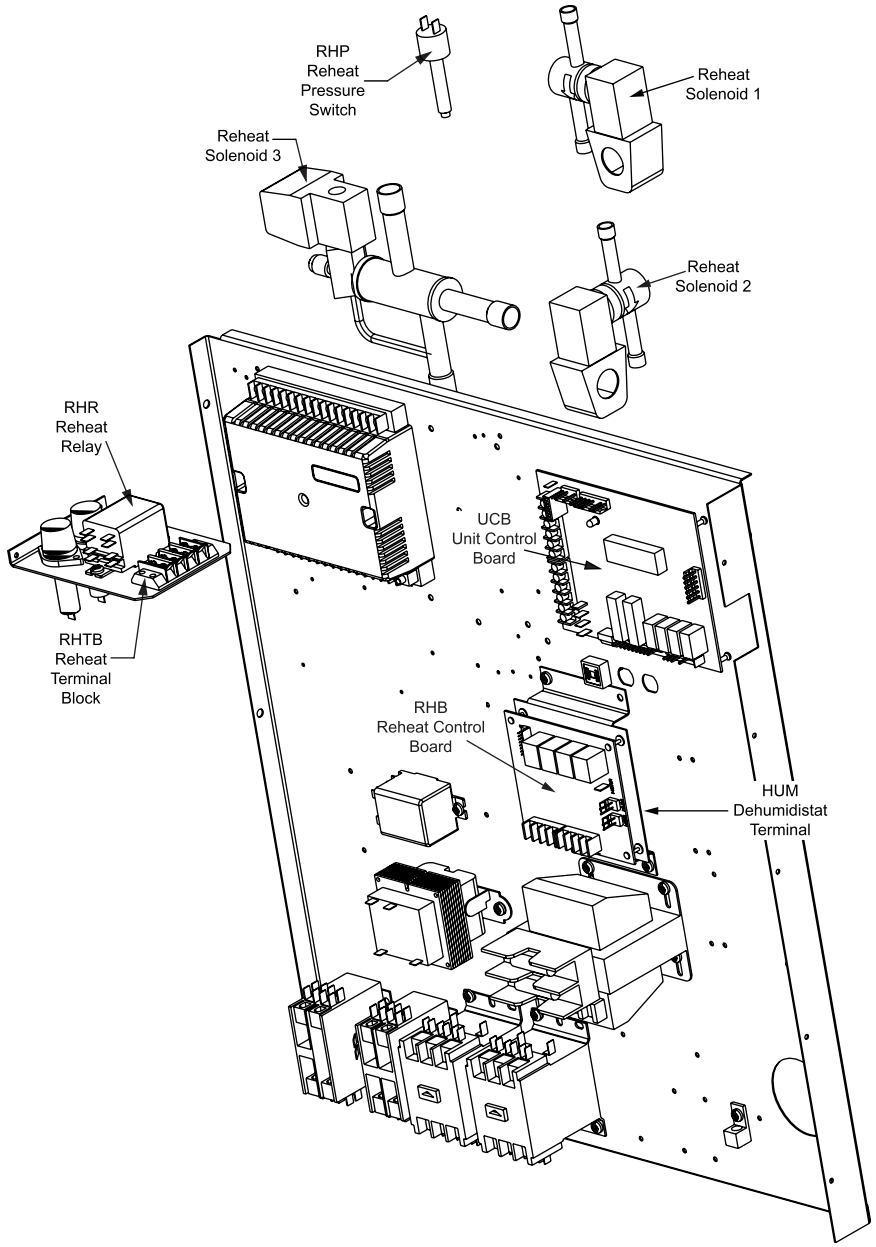


FIGURE 34 - DR150 REHEAT CONTROLS

ELECTRIC HEATING SEQUENCE OF OPERATIONS

The following sequence describes the operation of the electric heat section.

Two-stage heating:

a. Upon a call for first stage heat by the thermostat, the heater relay (RA) will be energized. After completing the specified fan on delay for heating, the UCB will energize the blower motor. If the second stage of heat is required, heater relay (RB) will be energized. After completing the specified fan on delay for heating, the UCB will energize the blower motor.

b. The thermostat will cycle the electric heat to satisfy the heating requirements of the conditioned space.

ELECTRIC HEAT OPERATION ERRORS

TEMPERATURE LIMIT

If the UCB senses zero volts from the high temperature limit, the indoor blower motor is immediately energized.

This limit is monitored regardless of unit operation status, i.e. the limit is monitored at all times.

If the temperature limit opens three times within one hour, it will lock-on the indoor blower motor and a flash code is initiated (See Table 41).

SAFETY CONTROLS

The UCB monitors the temperature limit switch of electric heat units.

The control circuit includes the following safety controls:

LIMIT SWITCH (LS)

This control is located inside the heater compartment and is set to open at the temperature indicated in the Electric Heat Limit Setting Table 35. It resets automatically. The limit switch operates when a high temperature condition, caused by inadequate supply air flow occurs, thus shutting down the heater and energizing the blower.

TABLE 35: ELECTRIC HEAT LIMIT SETTING

UNIT	VOLTAGE	HEATER kW	LIMIT SWITCH OPENS °F
090	208/230	9	150
090, 120, 150		18	150
090, 120, 150		24	150
090, 120, 150		34	150
120, 150		54	130
090	480	9	150
090, 120, 150		18	150
090, 120, 150		24	150
090, 120, 150		34	150
120, 150		54	130
090	600	9	150
090, 120, 150		18	150
090, 120, 150		24	150
090, 120, 150		34	150
120, 150		54	130

FLASH CODES

The UCB will initiate a flash code associated with errors within the system. Refer to UNIT CONTROL BOARD FLASH CODES Table 41.

RESET

Remove the call for heating by lowering the thermostat setting lower than the conditioned space temperature.This resets any flash codes.

ELECTRIC HEAT ANTICIPATOR SETPOINTS

It is important that the anticipator setpoint be correct. Too high of a setting will result in longer heat cycles and a greater temperature swing in the conditioned space. Reducing the value below the correct setpoint will give shorter “ON” cycles and may result in the lowering of the temperature within the conditioned space. Refer to Table 36 for the required electric heat anticipator setting.

TABLE 36: ELECTRIC HEAT ANTICIPATOR SETPOINTS

SETTING, AMPS	
W1	**W2**
0.13	0.1

GAS HEATING SEQUENCE OF OPERATIONS

When the thermostat calls for the first stage of heating, the low-voltage control circuit from “R” to “W1” is completed. A call for heat passes through the UCB to the **Ignition Control Board (ICB)**. The UCB monitors the “W1” call and acts upon any call for heat by monitoring the **Gas Valve (GV)**. Once voltage has been sensed at the GV, the UCB will initiate the fan on delay for heating, energizing the indoor blower the specified delay has elapsed.

When the thermostat has been satisfied, heating calls are ceased. The GV is immediately closed. The blower is de-energized after the fan off delay for heating has elapsed. The draft motor performs a 30-second post purge.

IGNITION CONTROL BOARD

FIRST STAGE OF HEATING

When the ICB receives a call for first stage of heating, “W1,” the draft motor is energized. Once the draft motor has been proven, a 30-second purge is initiated. At the end of the purge, the GV is opened, and the spark ignitor is energized for 10 seconds. The ICB then checks for the presence of flame. If flame is detected, the ICB enters a flame stabilization period. If flame was not detected, the GV closes, and a retry operation begins.

During the flame stabilization period, a loss of the flame for 2 seconds will cause the GV to close and the retry operation to begin. After the flame stabilization period, a loss of flame for 3/4 second will cause the GV to close and the retry operation to begin.

At the conclusion of the flame stabilization period, the ICB will operate the gas heat in high fire for an additional 60 seconds (for a total for 120 seconds of high fire operation). After this 60 seconds, the ICB will then use the call for the second stage of heat to control second stage operation of the GV.

When “W1” is satisfied, both valves are closed.

SECOND STAGE OF HEATING

When the ICB receives a call for the second stage of heating, “W2,” the ICB conducts a complete first stage ignition sequence. If this sequence is satisfied, the second main valve of the GV is opened.

When “W2” is satisfied, the second main valve is closed.

RETRY OPERATION

When a flame is lost or is not detected during an attempt to achieve ignition, a retry operation occurs. A 30-second purge is performed between ignition attempts.

If the unit fails after three ignition attempts, the furnace is locked-out for one hour. The furnace is monitored during this one-hour period for unsafe conditions.

RECYCLE OPERATION

When a flame is lost after the flame stabilization period, a recycle operation occurs. If the unit fails after five recycle attempts, the furnace is locked-out for one hour.

GAS HEATING OPERATION ERRORS

LOCK-OUT

A one-hour lockout occurs following three retries or five recycles. During the one-hour lockout, flame detection, limit conditions, and main valves are tested. Any improper results will cause the appropriate action to occur. Recycling the low voltage power cancels the lock-out.

TEMPERATURE LIMIT

If the UCB senses zero volts from the high temperature limit, the indoor blower motor is immediately energized. When the UCB again senses 24 volts from the temperature limit, the draft motor will perform a 15-second post-purge and the indoor blower will be de-energized following the elapse of the fan off delay for heating.

This limit is monitored regardless of unit operation status, i.e. this limit is monitored at all times.

If the temperature limit opens three times within one hour, it will lock-on the indoor blower motor and flash code is initiated (See Table 41).

FLAME SENSE

Flame sensing occurs at all times. If “W1” is not present and a flame is sensed for 2 seconds, the draft motor is energized and the GV is kept off. The ICB halts any operation until a flame is not detected. Once the flame detection is lost, the ICB performs a post-purge. Normal operation is allowed concurrently with the purge (i.e. this purge can be considered the purge associated with a call for “W1”).

If “W1” is present, a flame is sensed, but the GV is not energized, the draft motor is energized until the flame detection is lost. Normal operation is now allowed.

The flame detection circuitry continually tests itself. If the ICB finds the flame detection circuitry to be faulty, the ICB will not permit an ignition sequence and the draft motor is energized. If this failure should occur during an ignition cycle the failure is counted as a recycle.

GAS VALVE

The UCB and ICB continuously monitor the GV.

If the ICB senses voltage at the GV when not requested, the ICB will energize the draft motor. The ICB will not operate the furnace until voltage is no longer sensed at the GV. The draft motor is stopped when voltage is not sensed at the GV.

Any time the UCB senses voltage at the GV without a call for heat for a continuous five-minute period, the UCB will lock-on the indoor blower and a flash code is initiated (Table 41). When voltage is no longer sensed at the GV, the UCB will de-energize the indoor blower following the elapse of the fan off delay for heating.

If voltage has been sensed at the GV for at least 15 seconds during the fan on delay for heating and GV voltage or “W1” is lost, the indoor blower is forced on for the length of the fan off delay for heating.

During a call for heat, if the UCB does not sense voltage at the GV for a continuous five-minute period the UCB will initiate a flash code (Table 41). The indoor blower motor will not be locked-on while there is no GV voltage.

SAFETY CONTROLS

The UCB monitors the temperature limit switch of gas heat units.

The control circuit includes the following safety controls:

LIMIT SWITCH (LS)

This control is located inside the gas heat compartment and is set to open at the temperature indicated in the Gas Heat Limit Control Settings Table 37. It resets automatically. The limit switch operates when a high temperature condition, caused by inadequate supply air flow occurs, thus shutting down the heater and energizing the blower.

AUXILIARY LIMIT SWITCH (ALS)

This control is located inside the supply air compartment and is set to open at the temperature indicated in the Gas Heat Limit Control Settings Table 37. It resets manually. The limit switch operates when a high temperature condition, caused by inadequate supply air flow occurs, thus shutting down the heater and energizing the blower.

The auxiliary limit switch is wired in series with the limit switch. As such, the UCB cannot distinguish the auxiliary limit and the gas heat limit switch operation except the auxiliary is manual reset. Consequently, the control will respond in the same manner as outlined above under “Limit Switch”.

TABLE 37: GAS HEAT LIMIT CONTROL SETTINGS*

# of HX Tubes	Main Limit Setting
4	215°F
6	195°F
8	160°F

*. Rollout = 300°F, Auxiliary Limit = 200°F.

The ICB monitors the Pressure and Rollout switches of gas heat units.

The control circuit includes the following safety controls:

PRESSURE SWITCH (PS)

Once the draft motor has reached full speed and closes the pressure switch during a normal ignition sequence, if the pressure sw opens for 2 seconds, the GV will be de-energized, the ignition cycle is aborted, and the ICB flashes the appropriate code. See Table 42 Ignition Control Flash Codes. The draft motor is energized until the pressure switch closes or “W1” is lost.

ROLLOUT SWITCH (ROS)

The rollout switch is wired in series with the pressure switch. As such, the ICB cannot distinguish the rollout switch operation from that of the pressure switch.

Consequently, the control will only respond in the same manner as outlined above under “Pressure Switch”. An open rollout will inhibit the gas valve from actuating.

INTERNAL MICROPROCESSOR FAILURE

If the ICB detects an internal failure, it will cease all outputs, ignore inputs, and display the proper flash code for control replacement. The ICB remains in this condition until replaced.

FLASH CODES

The UCB will initiate a flash code associated with errors within the system. Refer to UNIT CONTROL BOARD FLASH CODES Table 41.

RESETS

Remove the call for heating by lowering the thermostat setting lower than the conditioned space temperature. This resets any flash codes.

GAS HEAT ANTICIPATOR SETPOINTS

It is important that the anticipator setpoint be correct. Too high of a setting will result in longer heat cycles and a greater temperature swing in the conditioned space. Reducing the value below the correct setpoint will give shorter “ON cycles and may result in the lowering of the temperature within the conditioned space. Refer to Table 38 for the required gas heat anticipator setting.

TABLE 38: GAS HEAT ANTICIPATOR SETPOINTS

SETTING, AMPS	
W1	**W2**
0.65	0.1

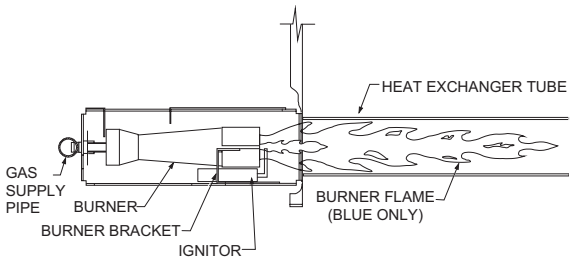


FIGURE 35 : TYPICAL FLAME

START-UP (COOLING)

PRESTART CHECK LIST

After installation has been completed:

1. Check the electrical supply voltage being supplied. Be sure that it is the same as listed on the unit nameplate.
2. Set the room thermostat to the off position.
3. Turn unit electrical power on.
4. Set the room thermostat fan switch to on.
5. Check indoor blower rotation.
   - If blower rotation is in the wrong direction. Refer to Phasing Section in general information section.
   - Check blower drive belt tension.
6. Check the unit supply air (CFM).
7. Measure evaporator fan motor's amp draw.
8. Set the room thermostat fan switch to off.
9. Turn unit electrical power off.

OPERATING INSTRUCTIONS

1. Turn unit electrical power on.

NOTE: Prior to each cooling season, the crankcase heaters must be energized at least 10 hours before the system is put into operation.

2. Set the room thermostat setting to lower than the room temperature.
3. First stage compressors will energize after the built-in time delay (five minutes).
4. The second stage of the thermostat will energize second stage compressor if needed.

POST START CHECK LIST

1. Verify proper system pressures for both circuits.
2. Measure the temperature drop across the evaporator coil.

START-UP (GAS HEAT)

PRE-START CHECK LIST

Complete the following checks before starting the unit.

1. Check the type of gas being supplied. Be sure that it is the same as listed on the unit nameplate.
2. Make sure that the vent outlet and combustion air inlet are free of any debris or obstruction.

OPERATING INSTRUCTIONS

⚠ CAUTION

This furnace is equipped with an automatic re-ignition system. DO NOT attempt to manually light the pilot.

LIGHTING THE MAIN BURNERS

1. Turn “OFF” electric power to unit.
2. Turn room thermostat to lowest setting.
3. Turn gas valve counter-clockwise to “ON” position (see Figure 36).
4. Turn “ON” electric power to unit.
5. If thermostat set temperature is above room temperature, the main burners will ignite. If a second stage of heat is called for, the main burners for second stage heat will ignite for the second stage heat.

POST START CHECKLIST

After the entire control circuit has been energized and the heating section is operating, make the following checks:

1. Check for gas leaks in the unit piping as well as the supply piping.

⚠WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warning exactly could result in serious injury, death or property damage.

Never test for gas leaks with an open flame. use a commercially available soap solution made specifically for the detection of leaks to check all connections. A fire or explosion may result causing property damage, personal injury or loss of life.

2. Check for correct manifold gas pressures. (See 'CHECKING GAS INPUT'.)

3. Check the supply gas pressure. It must be within the limits shown on the rating nameplate. Supply pressure should be checked with all gas appliances in the building at full fire. At no time should the standby gas pressure exceed 10.5 in. or the operating pressure drop below 4.5 in for natural gas units. If gas pressure is outside these limits, contact the local gas utility or propane supplier for corrective action.

SHUT DOWN

1. Set the thermostat to the lowest temperature setting.

2. Turn "OFF" all electric power to unit.

3. Open gas heat access panel.

4. Turn gas valve clockwise to "OFF" position (See Figure 36).

MANIFOLD GAS PRESSURE ADJUSTMENT

This gas furnace has two heat stages. Therefore, the gas valve has two adjustment screws located under a plastic protective cover. The second stage (100% input) adjustment screw is adjacent to the "HI" marking on the valve and the first stage (60% input) adjustment screw is located adjacent to the "LO" marking on the valve (See Figure 36).

Manifold pressure adjustment procedure.

Adjust second stage (100% input) pressure first, then adjust first stage (60% input) pressure.

1. Turn off all power to the unit.

2. Using the outlet pressure port on the gas valve, connect a manometer to monitor the manifold pressure.

3. Remove plastic cap covering HI and LO pressure adjustment screws.

4. Turn on power to the unit.

5. Set thermostat to call for second stage heat and start furnace.

6. If necessary, using a screwdriver, turn the second stage adjustment screw (adjacent to the "HI" marking on the valve) clockwise to increase manifold pressure or counterclockwise to decrease manifold pressure. **Be sure not to over-fire the unit on second stage**.

7. After the high manifold pressure has been checked, adjust the thermostat to call for first stage heat.

8. If necessary, using a screwdriver, turn the first stage adjustment screw (adjacent to the "LO" marking on the valve) clockwise to increase manifold pressure or counterclockwise to decrease manifold pressure. **Be sure not to under-fire the unit on first stage**.

9. Once pressure has been checked, replace the plastic cap covering the HI and LO pressure adjustment screws.

NOTE: When using natural gas, the manifold pressure for second stage (100% input) should be 3.5 IWG ± 0.3. The manifold pressure for first stage (60% input) when using natural gas should be 1.5 IWG ± 0.3.

TABLE 39: GAS HEAT STAGES

# of Burner Tubes	2nd Stage Input (100% Btuh)	1st Stage Input (60% Btuh)
4	120,000	72,000
6	180,000	108,000
8	240,000	144,000

CHECKING GAS INPUT

NATURAL GAS

This unit has two stages of gas heat. The first stage is 60% of the full fire input and is considered the minimum input for the furnace. The intended input for each furnace is shown in the table below. The following Table applies to units operating on 60 Hz power only.

To determine the rate of gas flow (Second Stage).

1. Turn off all other gas appliances connected to the gas meter.

2. Turn on the furnace and make sure the thermostat is calling for Second stage (100% input) heat.

3. Measure the time needed for one revolution of the hand on the smallest dial on the meter. A typical gas meter has a 1/2 or a 1 cubic foot test dial.

4. Using the number of seconds it takes for one revolution of the dial, calculate the cubic feet of gas consumed per hour. (See example below).

5. If necessary, adjust the high pressure regulator as discussed in the section “Manifold Gas Pressure Adjustment”. **Be sure not to over-fire** the furnace on Second stage. If in doubt, it is better to leave the Second stage of the furnace slightly under-fired. Repeat Steps 1-5.

To determine the rate of gas flow (First Stage)

1. Turn off all other gas appliances connected to the gas meter.

2. Turn on the furnace and make sure the thermostat is calling for first stage (60% input) heat.

3. Even when the thermostat is calling for first stage heat, the unit will light on second stage and will run on Second stage for 1 minute. Allow this one-minute time period to expire and be certain the unit is running on first stage.

4. Measure the time needed for one revolution of the hand on the smallest dial on the meter. A typical gas meter has a 1/2 or a 1 cubic foot test dial.

5. Using the number of seconds it takes for one revolution of the dial, calculate the cubic feet of gas consumed per hour (See example).

6. If necessary, adjust the low pressure regulator as discussed in the section “Manifold Gas Pressure Adjustment”. **Be sure not to under-fire** the furnace on first stage. If in doubt, it is better to leave the first stage of the furnace slightly over-fired (greater than 60% input). Repeat Steps 1-6.

TABLE 40: GAS RATE CUBIC FEET PER HOUR

Seconds for One Rev.	Size of Test Dial	
	1/2 cu. ft.	1 cu. ft.
10	180	360
12	150	300
14	129	257
16	113	225
18	100	200
20	90	180
22	82	164
24	75	150
26	69	138
28	64	129
30	60	120
32	56	113
34	53	106
36	50	100
38	47	95
40	45	90
42	43	86
44	41	82
46	39	78
48	37	75
50	36	72
52	35	69
54	34	67
56	32	64
58	31	62
60	30	60

NOTE: To find the Btu input, multiply the number of cubic feet of gas consumed per hour by the Btu content of the gas in your particular locality (contact your gas company for this information as it varies widely from area to area).

EXAMPLE:

By actual measurement, it takes 19 seconds for the hand on a 1 cubic foot dial to make a revolution with a 192,000 Btuh furnace running. To determine rotations per minute, divide 60 by 19 = 3.16. To calculate rotations per hour, multiply 3.16 • 60 = 189.6. Multiply 189.6 • 1 (0.5 if using a 1/2 cubic foot dial) = 189.6. Multiply 189.6 • (the Btu rating of the gas). For this example, assume the gas has a Btu rating of 1050 Btu/ft.^{3}. The result of 199,000 Btuh is within 5% of the 192,000 Btuh rating of the furnace.

ADJUSTMENT OF TEMPERATURE RISE

The temperature rise (the difference of temperature between the return air and the heated air from the furnace) must lie within the range shown on the CSA rating plate and the data in Table 16.

After the temperature rise has been determined, the CFM can be calculated as follows:

$$\text{CFM} = \text{Btu Input} \bullet \frac{0.8}{(1.08 \cdot \Delta°\text{F})}$$

After about 20 minutes of operation, determine the furnace temperature rise. Take readings of both the return air and the heated air in the ducts (about 6 feet from the furnace) where they will not be affected by radiant heat. Increase the blower CFM to decrease the temperature rise; decrease the blower CFM to increase the rise (See 'SUPPLY AIR DRIVE ADJUSTMENT').

NOTE: Each gas heat exchanger size has a minimum allowable CFM. Below this CFM, the limit will open.

BURNERS/ORIFICES INSPECTION/SERVICING

Before checking or changing burners, pilot or orifices, CLOSE MAIN MANUAL SHUT-OFF VALVE AND SHUT OFF ALL POWER TO THE UNIT.

1. Open the union fitting just upstream of the unit gas valve and downstream from the main manual shut-off valve in the gas supply line.
2. Remove the screws holding each end of the manifold to the manifold supports.
3. Disconnect wiring to the gas valves and spark igniter(s). Remove the manifold & gas valve assembly. Orifices can now be inspected and/or replaced.

To service burners, complete step 4.

4. Remove the heat shield on top of the manifold supports. Burners are now accessible for inspection and/or replacement.

NOTE: Reverse the above procedure to replace the assemblies.

Make sure that burners are level and seat at the rear of the gas orifice.

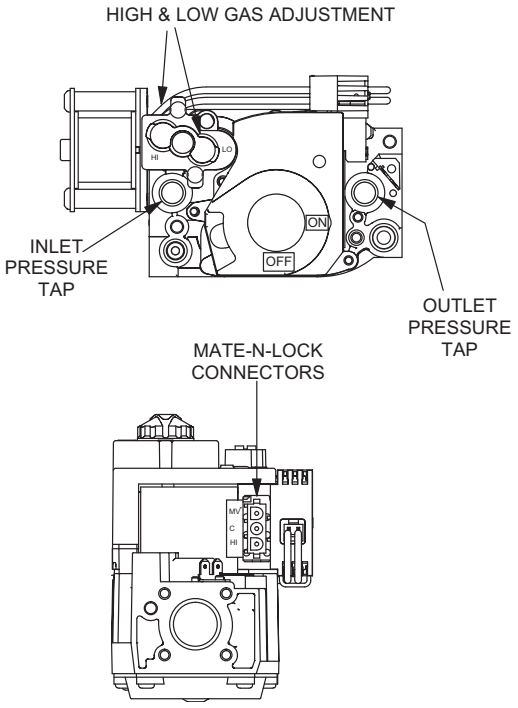


FIGURE 36 : TYPICAL GAS VALVE

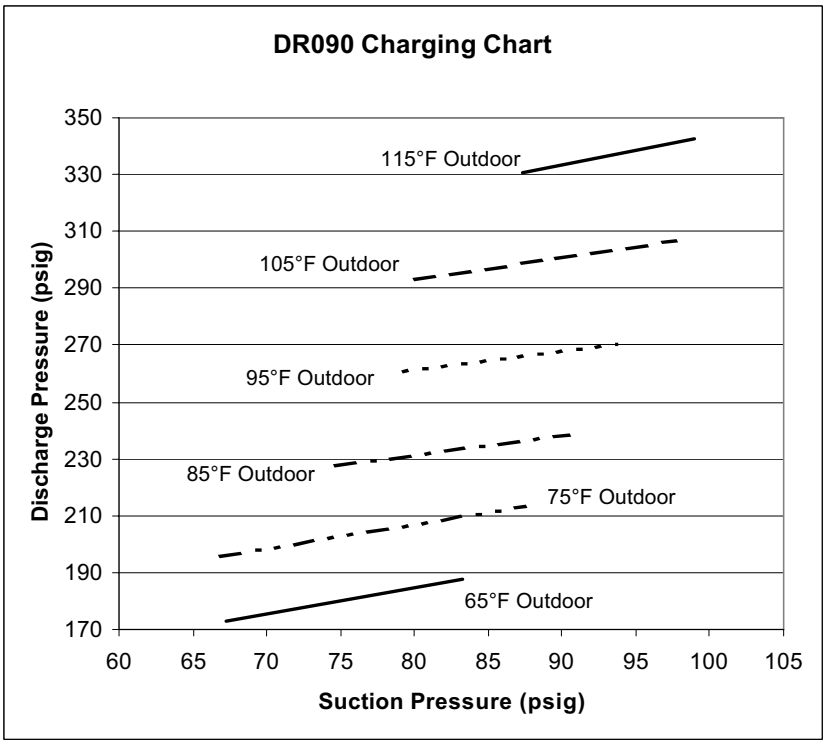


FIGURE 37: CHARGING CHART DR090

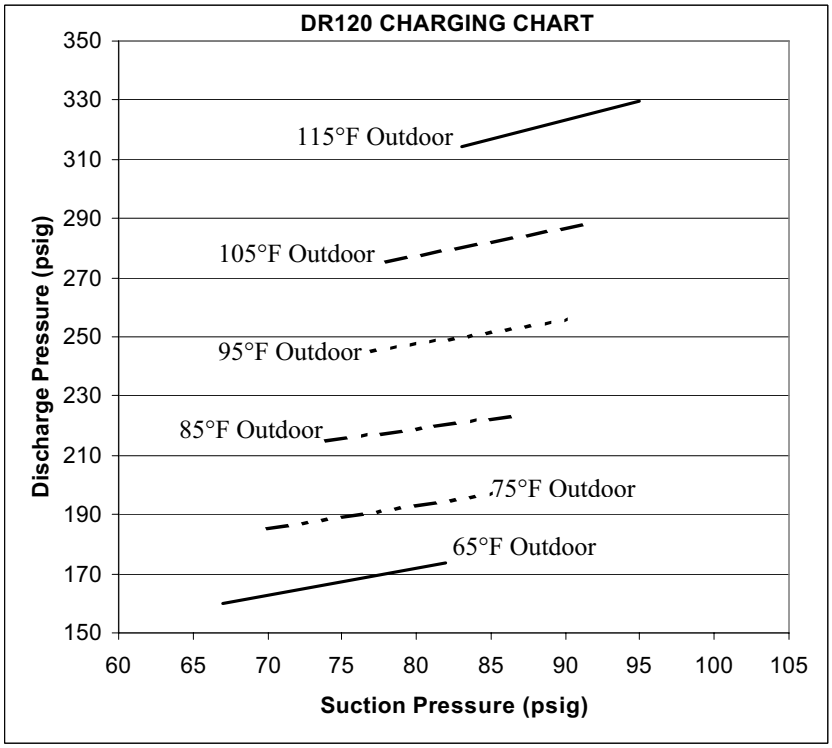


FIGURE 38: CHARGING CHART DR120

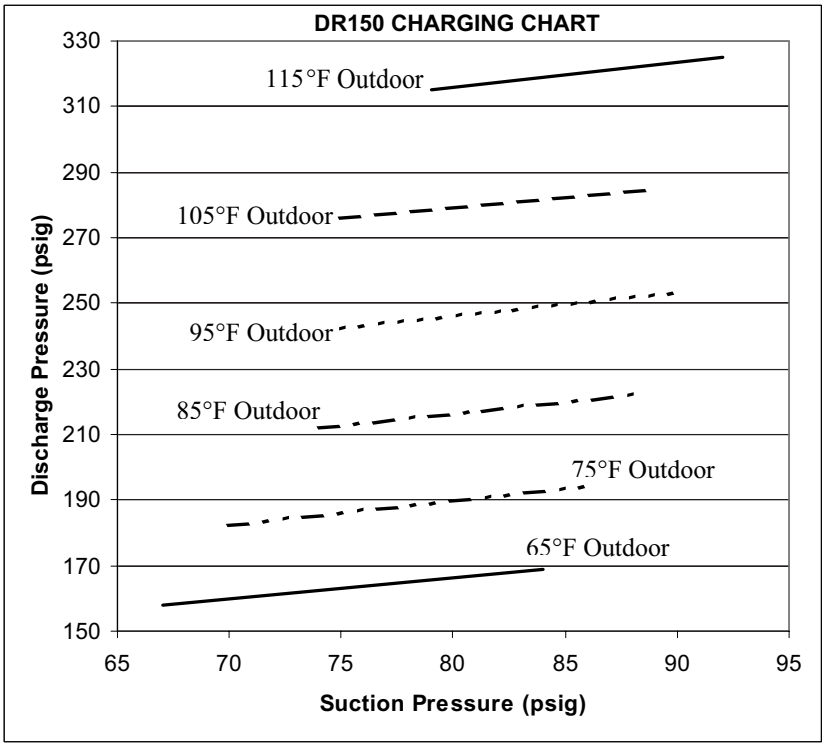


FIGURE 39: CHARGING CHART DR150

TROUBLESHOOTING

⚠WARNING

Troubleshooting of components may require opening the electrical control box with the power connected to the unit. **Use extreme care when working with live circuits!** Check the unit nameplate for the correct line voltage and set the voltmeter to the correct range before making any connections with line terminals.

When not necessary, shut off all electric power to the unit prior to any of the following maintenance procedures so as to prevent personal injury.

⚠ CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation which could cause injury to person and/or damage unit components. Verify proper operation after servicing.

PREDATOR® FLASH CODES

Various flash codes are utilized by the unit control board (UCB) to aid troubleshooting. Flash codes are distinguished by the short on and off cycle used (approximately 200ms on and 200ms off). To show normal operation, the control board flashes a 1 second on, 1 second off “heartbeat” during normal operation. This is to verify that the UCB is functioning correctly. Do not confuse this with an error flash code. To prevent confusion, a 1-flash, flash code is not used.

Current alarms are flashed on the UCB LED. The alarm history can be checked by pressing and releasing the ALARMS button on the UCB. The UCB will cycle through the last five (5) alarms, most recent to oldest, separating each alarm flash code by approximately 2 seconds.

In some cases, it may be necessary to “zero” the ASCD for the compressors in order to perform troubleshooting. To reset all ASCDs for one cycle, press and release the UCB TEST button once.

TABLE 41: UNIT CONTROL BOARD FLASH CODES

Flash Code	Description
On Steady	Control Failure - Replace Control
Heart Beat	Normal Operation
1 Flash	Not Applicable
2 Flashes	Control waiting ASCD*
3 Flashes	HPS1 - Compressor Lock out
4 Flashes	HPS2 - Compressor Lock out
5 Flashes	LPS1 - Compressor Lock out
6 Flashes	LPS2 - Compressor Lock out
7 Flashes	FS1 - Compressor Lock out
8 Flashes	FS2 - Compressor Lock out
9 Flashes	Ignition Control Locked Out/ Ignition Control Failure / Limit Switch Trip / No Jumper Plug in Heat Section
10 Flashes	Compressors Locked Out On Low Outdoor Air Temperature*
11 Flashes	Compressors Locked Out Because The Economizer Is Using Free Cooling*
12 Flashes	Fan Overload Switch Trip - Not Applicable On This Unit
13 Flashes	Compressor Held Off Due To Low Voltage*
14 Flashes	EEPROM Storage Failure (Control Failure)
OFF	No Power or Control Failure

*. These flash codes do not represent alarms.

TABLE 42: IGNITION CONTROL FLASH CODES

FLASHES	FAULT CONDITIONS	CHECK
STEADY ON	Control Failure	Control
HEARTBEAT	Normal Operation	
1	Not Applicable	
2	Pressure Switch Stuck Closed	Pressure Switch
3	Pressure Switch Failed To Close	Venter Pressure Switch Vent Blocked
4	Limit Switch Open	Main Limit AUX Limit
5	Flame Present With Gas Off First Stage Gas Valve Energized With W1 Off Second Stage Gas Valve Energized With First Stage Gas Valve Off	Gas Valve
6	Ignition Lockout	Gas Flow Gas Pressure Gas Valve Flame Sensor
STEADY OFF	No Power Or Control Failure	24VAC or Control

TABLE 43: REHEAT CONTROL BOARD FLASH CODES

FLASH CODES	DESCRIPTION
On Steady	This is a Control Failure
1 Flash	Not Applicable
2 Flashes	Hot Gas Reheat is on with Y1 Output (No Call for Cooling)
3 Flashes	Y1, Y2, and Hot Gas Reheat is on because of a call for Y1 and Humidistat. See alt operation
OFF	No Power or Control Failure

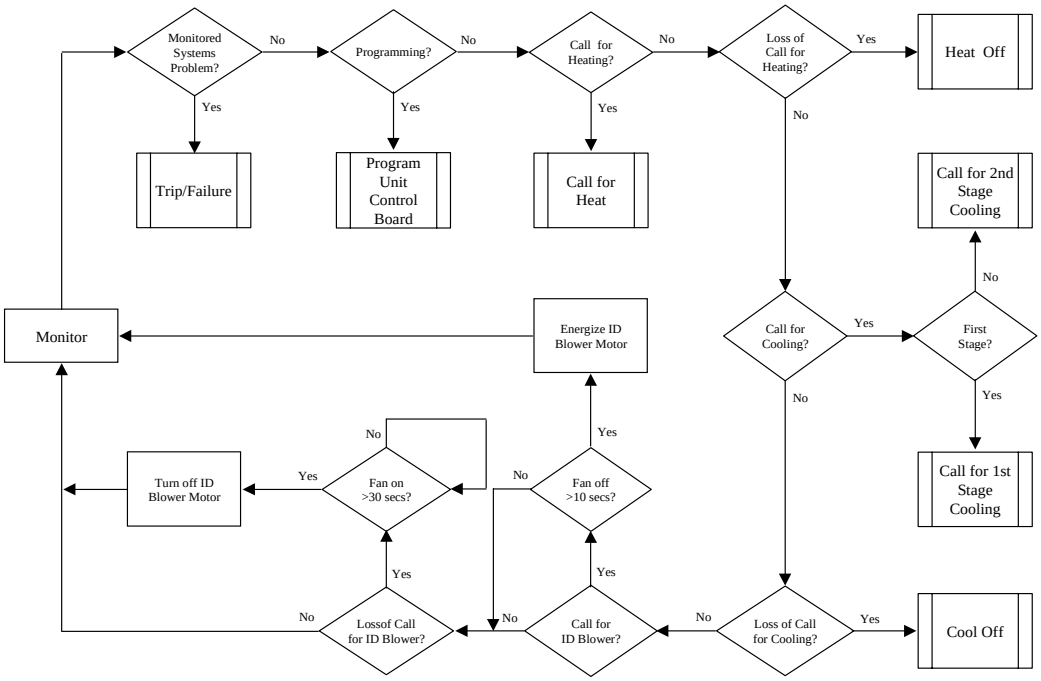


FIGURE 40 - BASIC TROUBLESHOOTING FLOWCHART

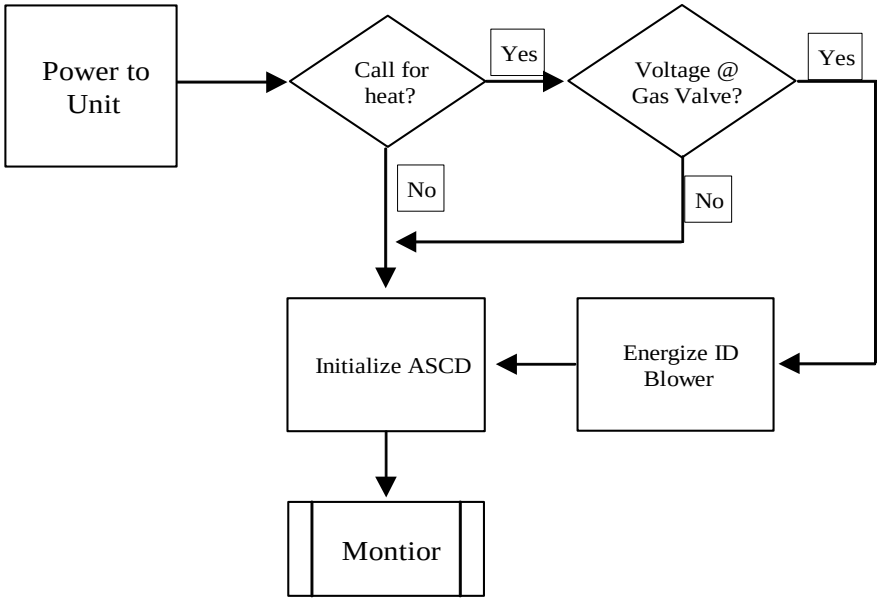
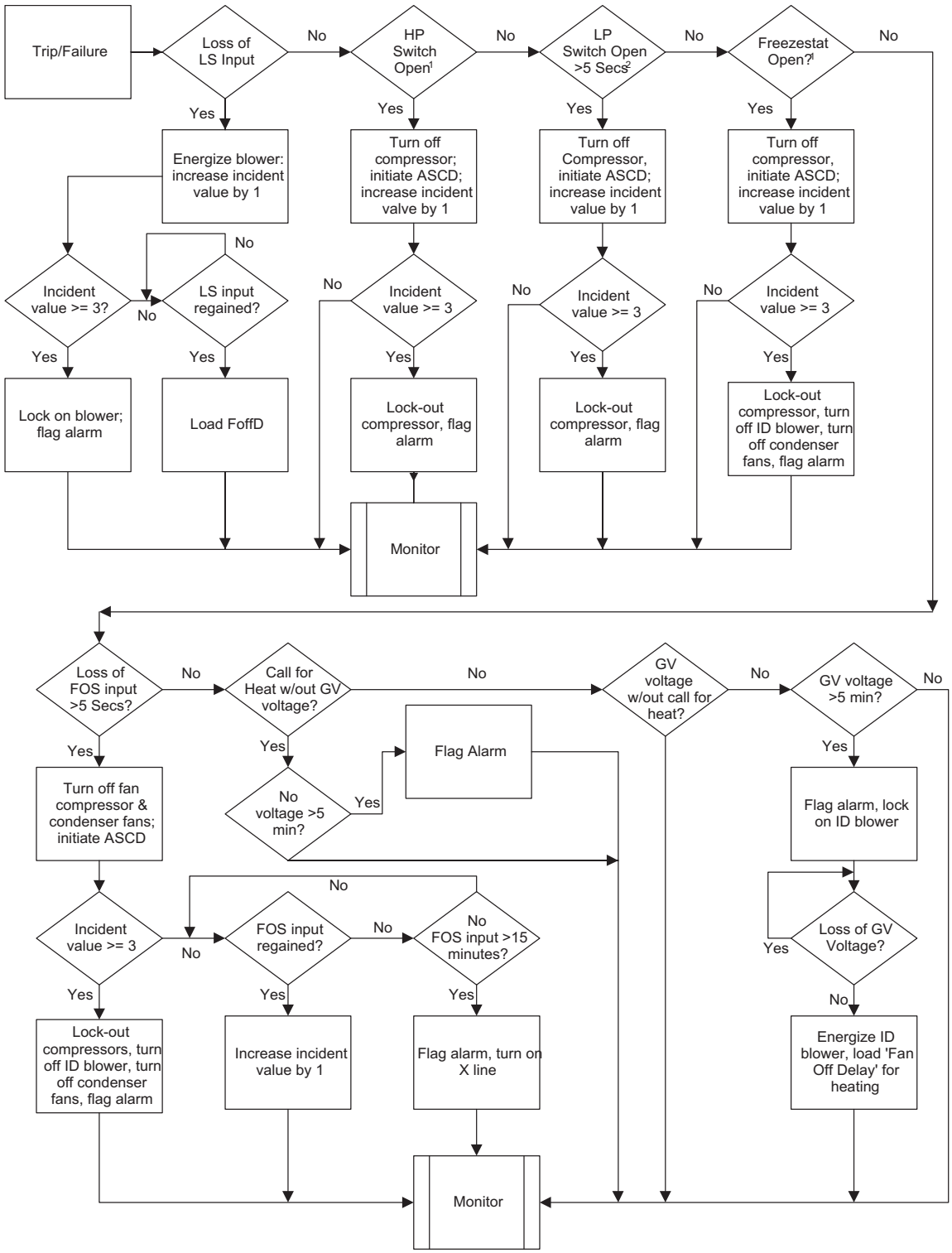


FIGURE 41 - POWER ON FLOW CHART



1 The control board only monitors the input when the compressor really is energized.
2 The low-pressure switch is not monitored for the first 30 seconds of compressor activity. The control board then monitors the switch to ensure it closes. If the switch remains open and additional 30 seconds, the control board turns off the associated compressor and initiates the ASCD. Once it has closed during the start up period, the control board no longer handles the low-pressure switch differently than other inputs.

FIGURE 42 - TRIP FAILURE FLOW CHART

COOLING TROUBLESHOOTING GUIDE

On calls for cooling, if the compressors are operating but the supply air blower motor does not energize after a short delay (the room thermostat fan switch is in the “AUTO” position):

1. Turn the thermostat fan switch to the ON position. If the supply air blower motor does not energize, go to Step 3.
2. If the blower motor runs with the fan switch in the ON position but will not run after the first compressor has energized when the fan switch is in the AUTO position, check the room thermostat for contact between R and G in the AUTO position during calls for cooling.
3. If the supply air blower motor does not energize when the fan switch is set to ON, check that line voltage is being supplied to the contacts of the M3, contactor, and that the contactor is pulled in. Check for loose wiring between the contactor and the supply air blower motor.
4. If M3 is pulled in and voltage is supplied to M3, lightly touch the supply air blower motor housing. If it is hot, the motor may be off on internal protection. Cancel any thermostat calls and set the fan switch to AUTO. Wait for the internal overload to reset. Test again when cool.
5. If M3 is not pulled in, check for 24 volts at the M3 coil. If 24 volts are present at M3 but M3 is not pulled in, replace the contactor.
6. Failing the above, if there is line voltage supplied at M3, M3 is pulled in, and the supply air blower motor still does not operate, replace the motor.
7. If 24 volts is not present at M3, check that 24 volts is present at the UCB supply air blower motor terminal, “FAN”. If 24 volts is present at the FAN, check for loose wiring between the UCB and M3.
8. If 24 volts is not present at the “FAN” terminal, check for 24 volts from the room thermostat. If 24 volts are not present from the room thermostat, check for the following:
    a. Proper operation of the room thermostat (contact between R and G with the fan switch in the ON position and in the AUTO position during operation calls).
    b. Proper wiring between the room thermostat and the UCB, and
    c. Loose wiring from the room thermostat to the UCB
9. If 24 volts is present at the room thermostat but not at the UCB, check for proper wiring between the thermostat and the UCB, i.e. that the thermostat G terminal is connected to the G terminal of the UCB, and for loose wiring.
10. If the thermostat and UCB are properly wired, replace the UCB.

On calls for cooling, the supply air blower motor is operating but compressor #1 is not (the room thermostat fan switch is in the “AUTO” position):

1. If installed, check the position of the economizer blades. If the blades are open, the economizer is providing free cooling and the compressors will not immediately operate. If both stages of cooling are requested simultaneously and the economizer provides free cooling, following a short delay compressor #1 will be energized unless it is locked out. If compressor #1 is locked out, compressor #2 is energized. Compressor #2 is always energized in place of compressor #1 when compressor #1 is requested but locked out.
2. If no economizer is installed or the economizer is not opening to provide free cooling and compressor #1 does not energize on a call for cooling, check for line voltage at the compressor contactor, M1, and that the contactor is pulled in. Check for loose wiring between the contactor and the compressor.
3. If M1 is pulled in and voltage is supplied at M1, lightly touch the compressor housing. If it is hot, the compressor may be off on inherent protection. Cancel any calls for cooling and wait for the internal overload to reset. Test again when cool.
4. If M1 is not pulled in, check for 24 volts at the M1 coil. If 24 volts are present and M1 is not pulled in, replace the contactor.
5. Failing the above, if voltage is supplied at M1, M1 is pulled in, and the compressor still does not operate, replace the compressor.
6. If 24 volts is not present at M1, check for 24 volts at the UCB terminal, C1. If 24 volts is present, check for loose wiring between C1 and the compressor contactor.
7. If 24 volts is not present at the C1 terminal, check for 24 volts from the room thermostat at the UCB Y1 terminal. If 24 volts is not present from the room thermostat, check for the following:
    a. 24 volts at the thermostat Y1 terminal
    b. Proper wiring between the room thermostat and the UCB, i.e. Y1 to Y1, Y2 to Y2, and
    c. Loose wiring from the room thermostat to the UCB
8. If 24 volts is present at the UCB Y1 terminal, the compressor may be out due to an open high-pressure switch, low-pressure switch, or freezestat. Check for 24 volts at the HPS1, LPS1, and FS1 terminals of the UCB. If a switch has opened, there should be a voltage potential between the UCB terminals, e.g. if LPS1 has opened, there will be a 24-volt potential between the LPS1 terminals.
9. If 24 volts is present at the UCB Y1 terminal and none of the protection switches have opened, the UCB may have

locked out the compressor for repeat trips. The UCB should be flashing an alarm code. If not, press and release the ALARMS button on the UCB. The UCB will flash the last five alarms on the LED. If the compressor is locked out, cancel any call for cooling. This will reset any compressor lock outs.

NOTE: While the above step will reset any lockouts, compressor #1 may be held off for the ASCD. See the next step.

10. If 24 volts is present at the UCB Y1 terminal and none of the switches are open and the compressor is not locked out, the UCB may have the compressor in an ASCD. Check the LED for an indication of an ASCD cycle. The ASCD should time out within 5 minutes. Press and release the TEST button to reset all ASCDs.

11. If 24 volts is present at the UCB Y1 terminal and the compressor is not out due to a protective switch trip, repeat trip lock out, or ASCD, the economizer terminals of the UCB may be improperly wired. Check for 24 volts at the Y1 “OUT” terminal of the UCB. If 24 volts is present, trace the wiring from Y1 “OUT” for incorrect wiring. If 24 volts is not present at the Y1 “OUT” terminal, the UCB must be replaced.

12. *For units without economizers*: If 24 volts is present at the Y1 OUT terminal, check for 24 volts at the Y1 “ECON” terminal. If 24 volts is not present, check for loose wiring from the Y1 “OUT” terminal to the Mate-N-Lock plug, the jumper in the Mate-N-Lock plug, and in the wiring from the Mate-N-Lock plug to the Y1 “ECON” terminal.

13. *For units with economizers*: If 24 volts is present at the Y1 “OUT” terminal, check for 24 volts at the Y1 “ECON” terminal. If 24 volts is not present, check for loose wiring from the Y1 “OUT” terminal to the Mate-N-Lock plug, a poor connection between the UCB and economizer Mate-N-Lock plugs, loose wiring from the Mate-N-Lock plug to the economizer, back to the Mate-N-Lock plug, and from the Mate-N-Lock plug to the Y1 “ECON” terminal. If nothing is found, the economizer control may have faulted and is failing to return the 24-volt “call” to the Y1 “ECON” terminal even though the economizer is not providing free cooling. To test, disconnect the Mate-N-Locks and jumper between the WHITE and YELLOW wires of the UCB’s Mate-N-Lock plug. If compressor #1 energizes, there is a fault in the economizer wiring or the economizer control.

14. The UCB can be programmed to lock out compressor operation during free cooling and in low ambient conditions. These options are not enabled by default. Local York distributors can test the UCB for this programming.

15. If none of the above corrected the error, test the integrity of the UCB. Disconnect the C1 terminal wire and jumper it to the Y1 terminal. DO NOT jump the Y1 to C1 terminals. If the compressor engages, the UCB has faulted.

16. If none of the above correct the error, replace the UCB.

On calls for the second stage of cooling, the supply air blower motor and compressor #1 are operating but compressor #2 is not (the room thermostat fan switch is in the “AUTO” position):

1. If installed, check the position of the economizer blades. If the blades are open, the economizer is providing free cooling. If the second stage of cooling is requested, following a short delay, compressor #1 will be energized unless it is locked out. Typically, compressor #2 is energized only during free cooling if the call for the second stage of cooling persists for 20 minutes.

2. Compressor #2 will not energize simultaneously with compressor #1 if a call for both stages of cooling is received. The UCB delays compressor #2 by 30 seconds to prevent a power surge. If after the delay compressor #2 does not energize on a second stage call for cooling, check for line voltage at the compressor contactor, M2, and that the contactor is pulled in. Check for loose wiring between the contactor and the compressor.

3. If M2 is pulled in and voltage is supplied at M2, lightly touch the compressor housing. If it is hot, the compressor may be off on inherent protection. Cancel any calls for cooling and wait for the internal overload to reset. Test again when cool.

4. If M2 is not pulled in, check for 24 volts at the M2 coil. If 24 volts is present and M2 is not pulled in, replace the contactor.

5. Failing the above, if voltage is supplied at M2, M2 is pulled in, and the compressor still does not operate, replace the compressor.

6. If 24 volts is not present at M2, check for 24 volts at the UCB terminal, C2. If 24 volts are present, check for loose wiring between C2 and the compressor contactor.

7. If 24 volts is not present at the C2 terminal, check for 24 volts from the room thermostat at the UCB Y2 terminal. If 24 volts is not present from the room thermostat, check for the following:

   a. 24 volts at the thermostat Y2 terminal

   b. Proper wiring between the room thermostat and the UCB, i.e. Y1 to Y1, Y2 to Y2, and

   c. Loose wiring from the room thermostat to the UCB

8. If 24 volts is present at the UCB Y2 terminal, the compressor may be out due to an open high-pressure switch, low-pressure switch, or freezestat. Check for 24 volts at the HPS2, LPS2, and FS2 terminals of the UCB. If a switch has opened, there should be a voltage potential between the UCB terminals, e.g. if LPS2 has opened, there will be 24 volts of potential between the LPS2 terminals.

9. If 24 volts is present at the UCB Y2 terminal and none of the protection switches have opened, the UCB may have locked out the compressor for repeat trips. The UCB should be flashing a code. If not, press and release the ALARMS button on the UCB. The UCB will flash the last five alarms on the LED. If the compressor is locked out,

   remove any call for cooling at the thermostat or by disconnecting the thermostat wiring at the Y2 UCB terminal. This will reset any compressor lock outs.

NOTE: While the above step will reset any lock outs, compressor #1 will be held off for the ASCD, and compressor #2 may be held off for a portion of the ASCD. See the next step.

10. If 24 volts is present at the UCB Y2 terminal and none of the switches are open and the compressor is not locked out, the UCB may have the compressor in an ASCD. Check the LED for an indication of an ASCD cycle. The ASCD should time out within 5 minutes. Press and release the TEST button to reset all ASCDs.

11. The UCB can be programmed to lock out compressor operation during free cooling and in low ambient conditions. These options are not enabled by default. Local York distributors can test the UCB for this programming.

12. If none of the above corrected the error, test the integrity of the UCB. Disconnect the C2 terminal wire and jumper it to the Y2 terminal. DO NOT jump the Y2 to C2 terminals. If the compressor engages, the UCB has faulted.

13. If none of the above correct the error, replace the UCB.

On a call for cooling, the supply air blower motor and compressor #2 are operating but compressor #1 is not (the room thermostat fan switch is in the “AUTO” position):

1. Compressor #2 is energized in place of compressor #1 when compressor #1 is unavailable for cooling calls. Check the UCB for alarms indicating that compressor #1 is locked out. Press and release the ALARMS button if the LED is not flashing an alarm.

2. Check for line voltage at the compressor contactor, M1, and that the contactor is pulled in. Check for loose wiring between the contactor and the compressor.

3. If M1 is pulled in and voltage is supplied at M1, lightly touch the compressor housing. If it is hot, the compressor may be off on inherent protection. Cancel any calls for cooling and wait for the internal overload to reset. Test again when cool.

4. If M1 is not pulled in, check for 24 volts at the M1 coil. If 24 volts is present and M1 is not pulled in, replace the contactor.

5. Failing the above, if voltage is supplied at M1, M1 is pulled in, and the compressor still does not operate, replace the compressor.

6. If 24 volts is not present at M1, check for 24 volts at the UCB terminal, C1. If 24 volts is present, check for loose wiring between C1 and the compressor contactor.

7. If 24 volts is not present at the C1 terminal, check for 24 volts from the room thermostat at the UCB Y1 terminal. If 24 volts are not present at the UCB Y1 terminal, the UCB may have faulted. Check for 24 volts at the Y1 ECON terminal. If 24 volts is not present at Y1 “ECON”, the UCB has faulted. The UCB should de-energize all compressors on a loss of call for the first stage of cooling, i.e. a loss if 24 volts at the Y1 terminal.

8. If 24 volts are present at the UCB Y1 terminal, the compressor may be out due to an open high-pressure switch, low-pressure switch, or freezestat. Check for 24 volts at the HPS1, LPS1, and FS1 terminals of the UCB. If a switch has opened, there should be a voltage potential between the UCB terminals, e.g. if LPS1 has opened, there will be a 24-volt potential between the LPS1 terminals.

9. If 24 volts is present at the UCB Y1 terminal and none of the protection switches have opened, the UCB may have locked out the compressor for repeat trips. The UCB should be flashing a code. If not, press and release the ALARMS button on the UCB. The UCB will flash the last five alarms on the LED. If the compressor is locked out, remove any call for cooling. This will reset any compressor lock outs.

NOTE: While the above step will reset any lock outs, compressor #2 will be held off for the ASCD, and compressor #1 may be held off for a portion of the ASCD. See the next step.

10. If 24 volts is present at the UCB Y1 terminal and none of the switches are open and the compressor is not locked out, the UCB may have the compressor in an ASCD. Check the LED for an indication of an ASCD cycle. The ASCD should time out within 5 minutes. Press and release the TEST button to reset all ASCDs.

11. If 24 volts is present at the UCB Y1 terminal and the compressor is not out due to a protective switch trip, repeat trip lock out, or ASCD, the economizer terminals of the UCB may be improperly wired. Check for 24 volts at the Y1 “OUT” terminal of the UCB. If 24 volts is present, trace the wiring from Y1 “OUT” for incorrect wiring. If 24 volts is not present at the Y1 “OUT” terminal, the UCB must be replaced.

12. *For units without economizers*: If 24 volts is present at the Y1 “OUT” terminal, check for 24 volts at the Y1 “ECON” terminal. If 24 volts is not present, check for loose wiring from the Y1 “OUT” terminal to the Mate-N-Lock plug, the jumper in the Mate-N-Lock plug, and in the wiring from the Mate-N-Lock plug to the Y1 “ECON” terminal.

    For units with economizers:If 24 volts is present at the Y1 “OUT” terminal, check for 24 volts at the Y1 “ECON”

terminal. If 24 volts is not present, check for loose wiring from the Y1 “OUT” terminal to the Mate-N-Lock plug, a poor connection between the UCB and economizer Mate-N-Lock plugs, loose wiring from the Mate-N-Lock plug to the economizer, back to the Mate-N-Lock plug, and from the Mate-N-Lock plug to the Y1 “ECON” terminal. The economizer control may have faulted and is not returning the 24 volts to the Y1 “ECON” terminal even though the economizer is not providing free cooling. To test the economizer control, disconnect the Mate-N-Locks and jumper between the WHITE and YELLOW wires of the UCB’s Mate-N-Lock plug.

13. The UCB can be programmed to lock out compressor operation during free cooling and in low ambient conditions. These options are not enabled by default. They can be checked by local York distributors.
14. If none of the above corrected the error, test the integrity of the UCB. Disconnect the C1 terminal wire and jumper it to the Y1 terminal. DO NOT jump the Y1 to C1 terminals. If the compressor engages, the UCB has faulted.
15. If none of the above correct the error, replace the UCB.

GAS HEAT TROUBLESHOOTING GUIDE

On calls for heating, the draft motor operates and the furnace lights but the supply air blower motor does not energize after a short delay (the room thermostat fan switch is in “AUTO” position).

⚠WARNING

The furnace may shut down on a high temperature condition during the procedure. If this occurs, the UCB energize the supply air blower motor until the high temperature limit has reset. Caution should be used at all times as the supply air blower may energize regardless of the room thermostat fan switch position.

1. Place the thermostat fan switch in the “ON” position. If the supply air blower motor energizes, go to Step 9.
2. If the supply air blower motor does not energize when the fan switch is set to “ON,” check that line voltage is being supplied to the contacts of the M3 contactor, and that the contactor is pulled in. Check for loose wiring between the contactor and the supply air blower motor.
3. If M3 is pulled in and voltage is supplied at M3, lightly touch the supply air blower motor housing. If it is hot, the motor may be off on inherent protection. Cancel any thermostat calls and set the fan switch to “AUTO”, wait for the internal overload to reset. Test again when cool.
4. If M3 is not pulled in, check for 24 volts at the M3 coil. If 24 volts is present at M3 but M3 is not pulled in, replace the contactor.
5. Failing the above, if there is line voltage supplied at M3, M3 is pulled in, and the supply air blower motor still does not operate, replace the motor.
6. If 24 volts is not present at M3, check that 24 volts is present at the supply air blower motor terminal on the UCB. If 24 volts is present at the UCB terminal, check for loose wiring between the UCB and M3.
    a. If 24 volts is not present at the UCB supply air blower motor terminal, check for 24 volts from the room thermostat. If 24 volts is not present from the room thermostat, check for the following:
        i. Proper operation of the room thermostat (contact between R and G with the fan switch in the “ON” position and in the “AUTO” position during operation calls)
        ii. Proper wiring between the room thermostat and the UCB, and
        iii. Loose wiring from the room thermostat to the UCB
7. If 24 volts is present at the room thermostat but not at the UCB, check for proper wiring between the thermostat and the UCB, i.e. that the thermostat G terminal is connected to the G terminal of the UCB, and for loose wiring.
8. If the thermostat and UCB are properly wired, replace the UCB.
9. If the blower motor runs with the fan switch in the “ON” position but does not run shortly after the furnace has ignited when the fan switch is in the “AUTO” position, check the room thermostat for contact between R and G during “W1” calls.

On calls for heating, the supply air blower operates but the draft motor does not (the room thermostat fan switch is in the “AUTO” position).

1. The draft motor has inherent protection. If the motor shell is hot to the touch, wait for the internal overload to reset.
2. If the motor shell is cold with the room thermostat calling for heat, check for line voltage at the motor leads. If line voltage is present, replace the draft motor.
3. If line voltage is not present, check for line voltage on the ignition control at the “inducer” terminal draft motor relay (DMR or DMC) contacts in the main control box and check to see if the (DMR or DMC) is pulled in.

The draft motor runs but the furnace does not light and the spark ignitor does not spark.

1. Check for 24 volts at the spark ignitor from the ignition control board (ICB). Check the 24-volt wiring from the ICB to the spark ignitor. Check for 24 volts at the ICB spark ignitor terminal.
2. Check the ground wiring for the ICB and the gas valve is intact and making good electrical connection. Check the ceramic insulator on the spark ignitor for breaks or cracks. Replace the spark ignitor if damaged.
3. With the draft motor running, check for 24 volts at the pressure switch terminal on the ICB. If not present, check for 24 volts on the terminal from the pressure switch. If present, go to step 4. If 24 volts is not present, the either pressure or rollout switch is not closed. Or the draft motor is not sufficiently evacuating the heat exchanger tubes or the pressure switch has failed. Check the operation of the pressure switch. Check the line voltage to the unit; if line voltage is low, call the local power company. If the problem persists, the draft motor may need replacement.
4. If the furnace is hot, it may be out on a high temperature limit open; wait for limit reset.
5. If all are intact replace the ICB.

The draft motor runs and the spark ignitor sparks at the burner, but the burner does not ignite and a gas odor is not detected at the draft motor outlet.

1. Check to ensure gas is being supplied to the unit. Confirm that the gas pressure to the unit is within the proper limits as described in the “POST START CHECKLIST”.
2. Check the voltage at the gas valve and at the gas valve terminals on the ICB. Check all wiring between the ICB and the gas valve. Check to make sure the ground connections are intact.
3. If 24 volts is present, remove the pilot burner and the orifice. The removal procedure is described in “BURNER/ORIFICE INSPECTION/SERVICING.” Inspect the orifice for obstruction. If it is clear, replace the gas valve.

Main burners light but exhibit erratic flame characteristics.

1. Check the main burner orifices for obstruction and alignment. The removal procedure is described in “BURNER/ORIFICE INSPECTION/SERVICING”. Clean or replace burner orifices and burners as needed.

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127878-YIM-A-0405
Supersedes: 035-19763-000-A-1103/66446-YIM-A-1103